creative computing

April 1980
vol 6, no 4
$2.50

the #1 magazine of computer applications and software

Atari 400 vs. Pet

**Heath WH-89 —
In-depth evaluation**

**David Levy:
Intelligent Games**

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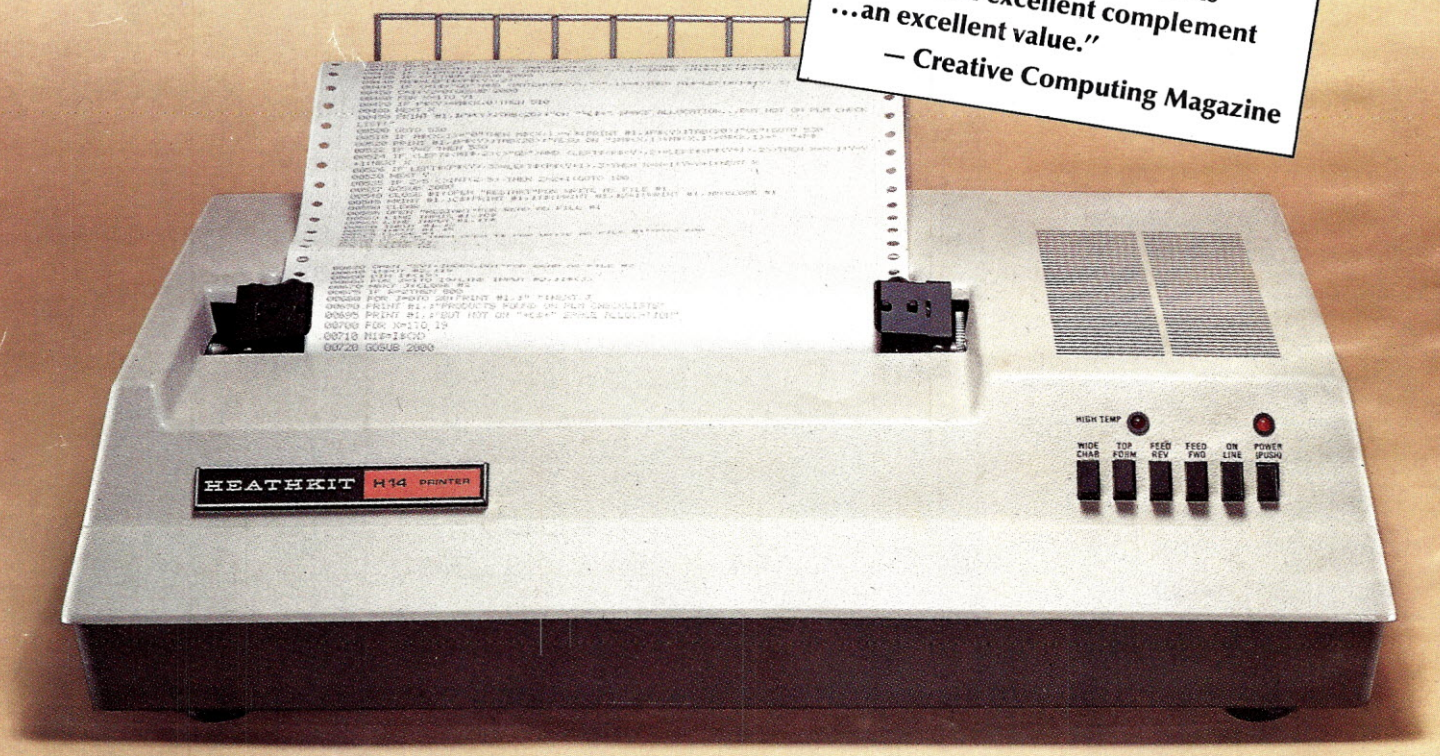

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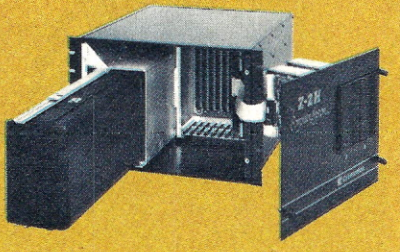

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Even at 5:12 a.m., it's hard to quit playing Personal Software™ strategy games.

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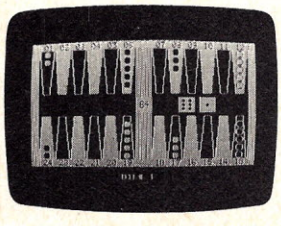
Gammon Gambler is a sure bet. With ten levels of skill, you can begin a novice and become an expert. Whichever level you play, the computer moves so quickly you don't have to wait. The program follows U.S. tournament rules, and includes the doubling cube to spice up the game. Written for the Apple and PET by Willy Chaplin. $19.95.



Gammon Gambler

Checker King—you probably forgot how much fun it is! If you move and change your mind, take it back and move again—without a peep from the computer. Play eight skill levels. Add and remove pieces. Save three board positions for later play. And solve three challenging checker puzzles. Written by Michael Marks for the Apple, PET and TRS-80. $19.95.

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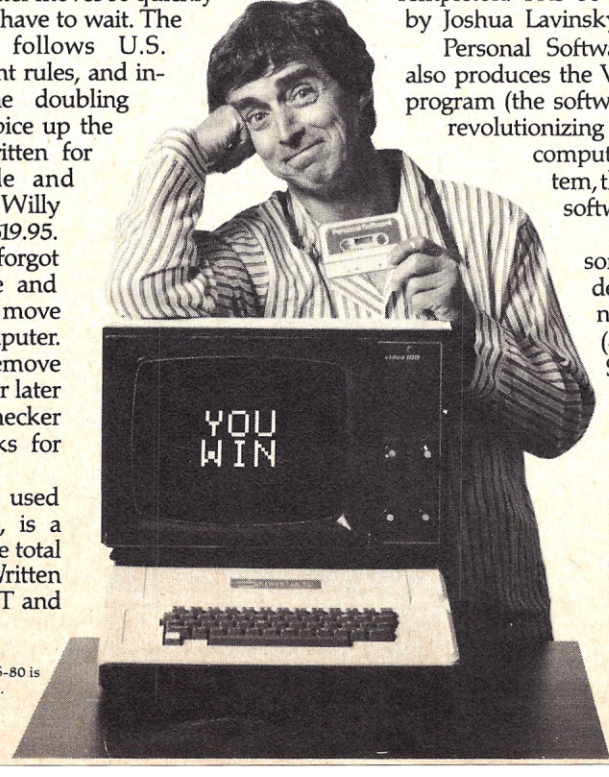
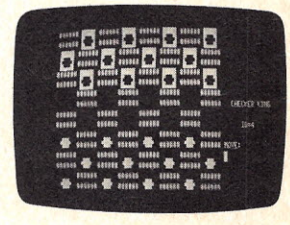


Bridge Partner. You against the computer in over 10 million different hands of contract bridge. You can even specify the hands' high card points. Written by George Duisman for the Apple, PET and Level II TRS-80. $19.95.

Time Trek is easy to learn, difficult to master and impossible to forget. Take command of a starship in real-time action to make the galaxy safe again. PET version by Brad Templeton. TRS-80 program by Joshua Lavinsky. $19.95.



Checker King

Personal Software, Inc., also produces the VisiCalc™ program (the software that's revolutionizing personal computing), CCA Data Management System, the Vitafacts series and other exciting software for the Apple, PET and TRS-80.

Now that you've read about the Personal Software programs, go see a demonstration. For the name of your nearest Personal Software dealer, call (408) 745-7841 or write to Personal Software, Inc., 592 Weddell Drive., Sunnyvale, CA 94086.

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CIRCLE 178 ON READER SERVICE CARD

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The cover was executed in ink and wash by James S. D'Angelo of Glen Rock, NJ.

April 1980. Volume 6, Number 4

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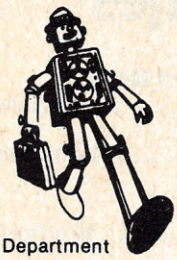

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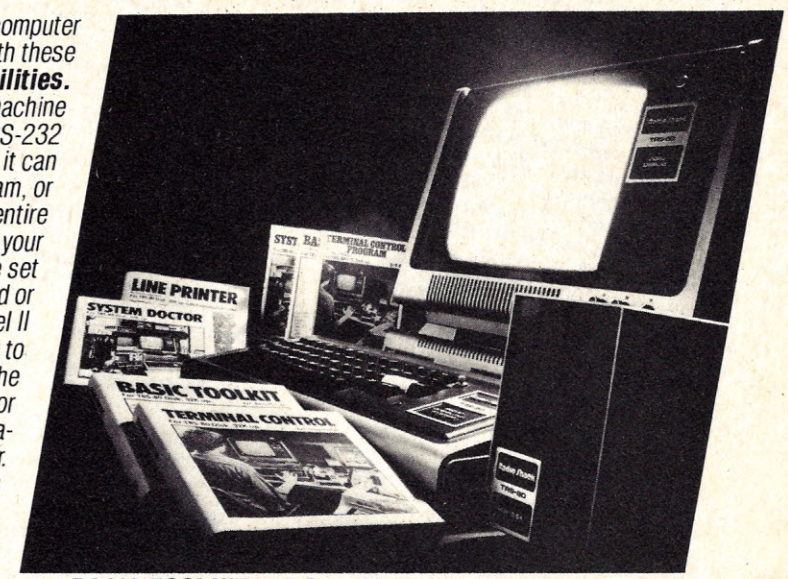
TBS-80 SYSTEM UTILITIES.

If you thought your TRS-80™ microcomputer was just a toy, think again. Enhance your system with these powerful ***TBS-80 system utilities.***

TERMINAL CONTROL *by F. Barry Mulligan is a machine language utility that enables you to use all the potentials of RS-232 tele-communications without hassle. Requiring 16K or more, it can interface to any Level II BASIC or assembly language program, or may be used as a stand-alone system to send and receive entire programs or data. The beauty of this program is that it turns your computer into a truly smart terminal. All RS-232 features can be set from the keyboard and the current values can be displayed or changed at any time. Basic programs can be sent in Level II compressed format for high-speed exchange. Whether you want to send or receive data from a BASIC program, or talk with the computer networks and bulletin boards or with any other terminal or computer or try any of the possibilities that computer communications has opened up,* ***TERMINAL CONTROL*** *is your answer. Only briefly described here, this remarkable program sells for only $19.80 on tape and $29.80 on disk.*

SYSTEM DOCTOR *does a thorough diagnostic check of your entire computer system. It lets you know if something is wrong before you spend time programming or entering data. The program checks the ROM to ensure that every bit is functional and checks the RAM six different ways. The disk drives are tested in a variety of ways to ensure reliability. The cassette recorder is also tested for speed, volume and distortion with the help of a calibration tape provided with the program. The video memory and display are also checked as well as the line printer.* ***SYSTEM DOCTOR*** *also does a 12-hour check of the entire system and records the results on tape, disk or the screen. As a bonus, this program also includes the* ***DISK DRIVE HEAD CLEANER.*** *The card insert that cleans the head can be obtained free by mailing in the coupon provided. For $28.50,* ***SYSTEM DOCTOR*** *is the first complete diagnostic program for the TRS-80. A disk version is available for $38.50.*

LINE PRINTER *by Dosse Segbeaya is a machine language program that accelerates printing on Centronics printers by making it a background task. Requiring 32K and a disk drive, this program enables the user to set aside up to 16K of memory as buffer which when filled is sent to the line printer while your Basic program continues to run. Any Basic program that uses LPRINT's will run significantly faster with this program. Also included is the ability to set the number of characters per line, the number of lines per page, the spaces between lines, and the left, top and bottom margins. Page numbers can be placed anywhere on the first line starting at any given number. Printouts of anything that is on the screen can also be made by hitting shift/break. If you do programming and you use multistatement lines,* ***LINE PRINTER*** *enables you to LLIST your program with single statement lines. This rather amazing program is resident in high memory as it interfaces with almost any Basic program. It sells on disk for $24.50.*



BASIC TOOLKIT *by F. Barry Mulligan is a basic programmer's dream come true. Requiring 16K or more, this program has the following features. Variables Map-Gives an alphabetical listing of each variable used, a list of the lines the variables appear on, and shows the number of times the variable appears on the line. Goto X Ref-Lists in numerical sequence the destination of each GOTO and GOSUB statement and the line number that it appears on. Recall-Allows you to recall a program after you have hit reset, accidentally typed NEW or have booted back to DOS. Merge-Enables you to merge tape or disk programs. Test Memory-Does a thorough check of memory to be sure every location is operable. Search Memory-Search for every occurrence of a two-byte combination and list the location where it occurs.* ***BASIC TOOLKIT*** *is resident in memory while programming and is accessed by hitting shift/break. A must for basic programmers, this utility sells for $19.80 on tape, $29.80 on disk.*

TBS *has other incredible software for Tandy's microcomputer. Intent on making it a powerful tool, we have large scale* ***business accounting systems, general accounting systems, data processing systems*** *and the* ***Library 100.*** *We have the only* ***DISK HEAD CLEANER*** *(for APPLE too!) and* ***GRAN MASTER DISKETTES,*** *the best on the market.*

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CIRCLE 114 ON READER SERVICE CARD

et cetera

et cetera

et cetera

Math & Technology Program

The National Institute of Education (NIE) and the National Science Foundation are initiating a joint program of development and research to improve the teaching and learning of school mathematics through the use of modern information-handling technology.

Primary emphasis on the program is on the development of prototypes of educationally relevant software, instructional courseware, and methods for assessing students' progress. These should respond to pedagogical needs and opportunities, be developed with the involvement of students and teachers and appropriately modified on the basis of experience. Associated research aimed at improving our knowledge of mathematics teaching and learning processes is an essential element in the program.

Two concerns inform the development and operation of this program. First is a need to devise ways of using new information-handling technology to reduce existing inequalities in educational performance. Secondly, the development of prototypes must proceed from the outset with a concern for assuring the successful adaptation of new technology in classrooms.

Mailing of announcements will be hastened if requests are accompanied by two self-addressed adhesive labels.

Science Education Directorate
National Science Foundation
Washington, D.C. 20550
(Telephone: 202 282-7910)

Pet Correction

Greg Yob has sent a correction for the March PET column. On page 161, the first example under "The PET Is Logical" should be:

AND: 1100 If both bits are one, the
0101 result is a one. If they
0100 don't, it gives zero.

Computer Camp

Plans for the fourth annual Camp Retupmoc have been announced by Rose-Hulman Institute of Technology. The program provides an intensive six-day computer workshop intended for college-bound males who have completed their junior year of high school.

Instruction in Basic will be provided along with lectures from computer experts and scientists, some from business and industry, on computer applications. No previous computer experience is necessary for any of the first five sessions to be held June 8-13, June 15-21, June 22-27, July 6-11, and July 13-18. The last camp, to be held July 20-25, is for students with previous experience in programming, and will concentrate on APL.

Contact Dr. John Kinney, Director of Camp Retupmoc, Rose-Hulman Institute of Technology, 5500 Wabash Ave., Terre Haute, IN 47803.

RF Modulator Tip

Personal Computer owners who plan to use their computer with a TV set should be aware of the following: If the tuning of the set is quartz frequency controlled with no user fine tuning, as is the latest trend, the Sup-R-Mod II by M&R Enterprises, and other RF modulators with no provision for tuning, may not work. Use a modulator which has frequency tunability such as the one available from ATV Research, 13th and Broadway, Dakota City, NE 68731.

Thanks to Donald J. Stoner of Cudahy, WI for this information.

Real Estate Correction

For those of you experiencing problems with line 250 of the listing for Real Estate Analysis (p.66, Feb. '80 **Creative**), Mr. Liebman writes that it should read:

K=1.+R2(J):L=K↑MO(J):N=M(J)*R2(J)*L

In addition, he points out a problem with line 1150 which should read as follows:

IF JFLAG<>2THEN GOTO 1180.

Language Symposium

The Vassar College Cognitive Science Group will hold a two-day symposium, April 25 and 26, 1980 at the Vassar campus in Poughkeepsie, New York. The symposium will be devoted to an exploration of the role which context plays in perception and interpretation of language. Context will be considered from the points of view of social, perceptual, intentional, linguistic, and computational analysis and the ways in which they are related.

Participation in the conference will be limited to the first 150 people who preregister.

Please contact: Cognitive Science Symposium, Vassar College, Box 525, Poughkeepsie, NY 12601 USA, (914) 452-7000, ext. 2407.

S-100 Magazine

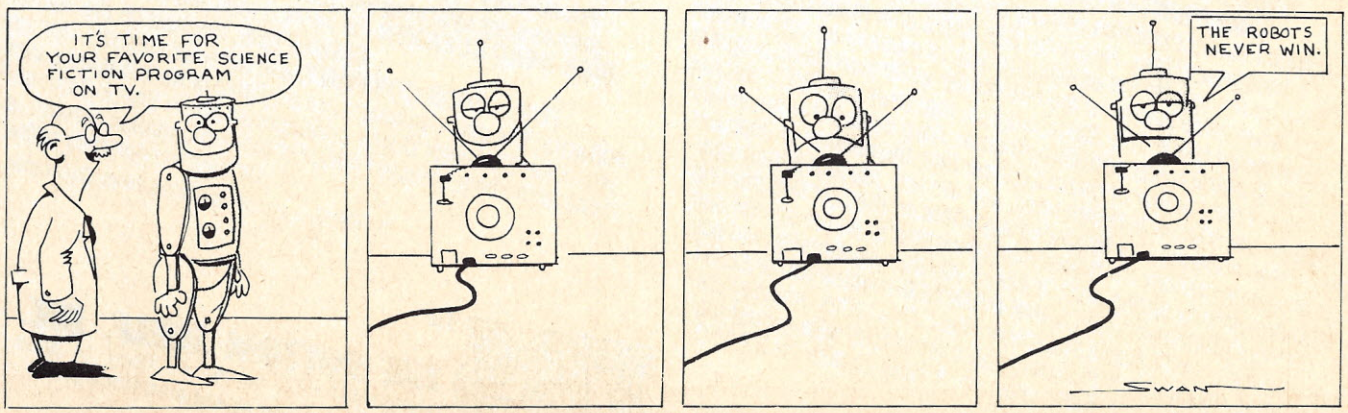
S-100 Microsystems is a new publication directed at users of S-100 microcomputer systems. It will be a forum on S-100 topics such as interfacing, CP/M, Pascal, Assembler, Fortran and Basic software.

Sol Libes, a pioneer in the field of personal computer systems will edit the publication. He is the founder and past president of the Amateur Computer Group of New Jersey.

S-100 MICROSYSTEMS will be published 6 times a year and sample copy is $2. Charter subscription is $7.50 (1 yr.), $14 (2 yr.) or $21.50 (3 yr.), prepaid USA. Canada is $9/yr. and Foreign $20/yr. (add $12 for Air Mail). This charter subscription offer expires April 30th, 1980.

For more information contact: Sol Libes, 201-277-2063, S-100 MICROSYSTEMS, Box 1192, Mountainside, NJ 07092.

Conversation enriches the understanding, but solitude is the school of genius.—Edward Gibbon



The easiest, least expensive way to generate spectacular multi-color graphics, sharp two-color alphanumerics: Your computer, a color tv set and the Percom Electric Crayon™.

Add the Electric Crayon™ to your system and your keyboard becomes a palette, the tv screen your medium.

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Shipped with EGOS™, 1K-byte of display memory and a comprehensive user's manual that includes an assembly language listing of EGOS™ and listings of BASIC demo programs, the Electric Crayon™ **costs only $249.95.**

Options include:

- LEVEL II BASIC color graphics programs on minidiskette: $17.95.
- A 34-conductor ribbon cable to interconnect the Electric Crayon™ to a TRS-80*: $24.95.
- RAM chips for adding refresh memory for higher density graphics modes: $29.95 per K-byte.
- Electric Crayon™ Sketchpad, a sketching grid of proportioned picture elements (pixels) in a tv aspect ratio. For 128 x 192 or 256 x 192 graphics modes. 11-inch by 17-inch, 25-sheet pads: $3.95 per pad.

SYSTEM REQUIREMENTS: the video circuitry of the Electric Crayon™ provides direct drive input to a video monitor or modified tv set. An internal up-modulator for rf antenna input may be constructed by adding inexpensive components to the existing video circuitry.

Prices and specifications subject to change without notice.

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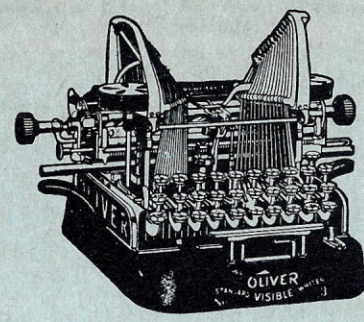

Appause for the SWTP 6809

Dear Editor:

This is in reply to Mr. Glen Worstell's letter (Feb.'80) regarding the SWTP 6809 system and his problems with it.We have ordered and received two SWTP 6809 systems here at NYU. One is the 6809-S with 128K of memory and the other is the 6809-A with 56K of memory. Both systems simply plugged together, plugged in and worked perfectly the first time. There have been no problems with the ROM SBUG-E monitor, the double-sided, double-density disks work perfectly and the CT-82 smart terminal is a delight. We have found the ROM documentation complete and useful and the information on the dynamic address translator to be perfectly adequate. Whenever we have called SWTP, their response has been very knowledgeable, helpful, and downright friendly! This goes for the president and includes all the staff in engineering and service.

One must realize that the 6809 is a very complex and sophisticated piece of hardware with a set of instruction modes as rich as the DEC PDP-11/34. The DAT resembles the PDP-11 memory management unit, and the orthagonality of registers is similar. The sequence of stack manipulations is different between the 6800 and the 6809, which can lead to much confusion to the programmer new to the 6809.

I can only assume that Mr. Worstell as president of Parsec Systems has a rusty axe to grind, or that he and his staff lack the technical sophistication to properly implement and appreciate the SWTP 6809.

Ted Wolff
NYU Medical Center
400 E. 34th Street
New York, NY 10016

SWTP Responds

Dear Editor:

Regarding the "unhappy" letter (Feb.'80, pag.13), I would like to respond to Worstell's inaccurate and intemperate statements and innuendos about the SWTP 6809 computer.

First, his complaint concerning the "non-existence" of documentation for the ROM monitor is nonsense. Enclosed is a copy of the User's Guide for the SBUG- E which is supplied to every purchaser of our computer including the complainant. Worstell's demands upon our company related to the proprietary design information for the monitor which is not provided with the computer, but which, in no way, limits the usability of the computer for the purpose for which it is sold.

Worstell's statement concerning "several bugs" in the monitor cannot be substantiated, and though we asked him for specifics, he would not, or could not, provide details. If such a problem were to exist, though none of our many other users have reported a problem, common sense tells you we would want to know the details and correct the problem, at once, for all of our users.

Worstell's second complaint concerned what he called the memory mapping hardware. He complained that there was "no documentation on how to use it or how it works." Apparently he is overlooking pages 10 through 15 of the Computer Manual (copies enclosed) where the subject is discussed at length. Worstell apparently refuses to understand that the 64K of memory address in the computer he purchased, our Model /09 (56K), is directly addressable and, as the documentation explaines, the Dynamic Address Translator is an integral part of a system designed for multi-tasking and multiple user environments (typically these functions will be implemented on our Model S/09 (128K and larger). Worstell is not correct in saying that he has paid for circuitry which he cannot use, simply because he has opted for a system which does not utilize that part of the standard design and for which he has paid nothing extra.

Regarding the 6809 OP codes, Worstell admits they are available from the chip manufacturer, Motorola. They are included in its extensive programming manual for the 6809 for sale to the public. We cannot accept his criticism that this company does not duplicate the expense of stocking and distributing Motorola's specialized literature. We know of no computer manufacturer who distributes the chip manufacturer's manuals to the end user.

Finally we categorically reject Worstell's parting shot that he had,"...been taken since they have our money..." Early on in our contacts with Worstell, when it became apparent that he was more interested in conflict and controversy than he was in conciliation, we invited him to return his system to us for a full refund of his purchase price. This he has not done.

I would apologize for the length of this letter, Mr. Ahl, but Worstell's letter, unrebutted, cannot fail to accomplish his obvious attempt to damage this company. The spirit of his attacks are damaging to this industry as well.

Daniel E. Meyer, President
Southwest Technical Products Corp.
219 W. Rhapsody
San Antonio, TX 78216

Praise for Creative's Super Invader

Dear Editor:

I would like to heap a few words of praise on the author of Apple Super Invader. A true masterpiece of program ming! No, that's not good enough! I look at all my dusty tapes and endless disk catalog listings of software, now mediocre at best, and sigh. What a waste of hard-earned money. Finally, my machine has truly come alive! For my investment, I could now have purchased the arcade machine itself, (which I've read that some individuals are actually doing). But then, what a waste that would be, as I wanted a versatile, fun and educational machine when I bought a computer. M. Hata, wherever you are, thank you!

I think your magazine is the best published for personal computing. I especially enjoyed Chuck Carpenter's Apple Cart in recent issues.

L. E. Thomas
61 John E. Smith Drive
Tewksbury, MA 01876

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The North Star Horizon computer can be found everywhere computers are used: business, engineering, home — even the classroom. Low cost, performance, reliability and software availability are the obvious reasons for Horizon's popularity. But, when a college bookstore orders our BASIC manuals, we know we have done the job from A to Z.

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— Melvin Davidson, Western Washington University, Bellingham, Washington

"After I gave a ½ hour demonstration of the Horizon to our students, the sign-ups for next term's class in BASIC jumped from 18 to 72."
— Harold Nay, Pleasant Hill HS, Pleasant Hill, California

"With our Horizon we brought 130 kids from knowing nothing about computers to the point of writing their own Pascal programs. I also use it to keep track of over 900 student files, including a weekly updated report card and attendance figures."
— Armando Picciotto, Kennedy HS, Richmond, California

"The Horizon is the best computer I could find for my class. It has an almost unlimited amount of software to choose from. And the dual diskette drives mean that we don't have to waste valuable classroom time loading programs, as with computers using cassette drives."
— Gary Montante, Ygnacio Valley HS, Walnut Creek, Calif.

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More on MicroComposer

Dear Editor:

Referring to the Micro Composer review (Feb.'80), I cannot accept credit for writing the Micro Composer software. The vast majority was written by David Williams of Micro Music, Inc. completely independent of Micro Technology or myself. I did supply the sound generation routine which is only a few hundred bytes of an otherwise huge program. The design of the music entry and editing program was done solely by Micro Music and, in my opinion, is clearly oriented towards teaching music rather than streamlined entry of music.

One thing the article failed to bring out is that the Micro Music system utilizes *software* sound synthesis with via digital-to-analog conversion. The music board supplied with the system is, in fact, an 8 bit digital-to-analog converter optimized for audio output applications. What this means is that software alone determines the type of sound produced by the system. With proper programming (not necessarily available yet), the Micro Music board could produce more than 4 musical voices, reasonably accurate musical instrument simulations, or even speech.

Another feature is the ability to create original tone colors with the system. The user can specify the harmonic makeup of each voice or optionally use the predefined ones.

One final point concerns the availability of stereo output. Two Micro Music boards can be used to produce stereo but the number of musical voices remains at four.

Hal Chamberlin
Vice Pres. of Engineering
Micro Technology Unlimited
P.O.Box 4596
Manchester, NH 03108

When to Castle

Dear Editor:

Concerning the February, 1980 Input/Output Chess comments by Stephen Kimmel:

Mister Kimmel is the recipient of some rotten input from Human 1400 when concerning the legitimacy of castling through check.

According to the Official Rules of Chess (US Chess Federation, Article 6.1:)

"Castling is prevented for the time being-

(a) if the king's original square **or the square which the king must cross** or that which it is to occupy is attacked by an enemy piece...."

Robert A Fowkes
(Human 1800)
3 Reeback Drive
Ossining, NY 10562

"Turning Over" The Clock

Dear Editor:

I enjoyed your October, 1979 issue, and the article "Graphics Digital Clock" pp. 110-113. However, the program contains a serious flaw as it was printed.

The problem arises when the clock attempts to "turn over." That is, when the clock tries to go from 12:59:59 to 1:00:00, (or from 23:59:59 to 00:00:00 in 24-hour format) the computer finds a "for-next" error and execution stops.

Fortunately, there is a simple solution. Insert these lines:

```
25  On error goto 1000
1000 If Z=24 then H=0:M=0:S=0:Resume 120
1010 If Z=12 then H=1:M=0:S=0:Resume 120
```

Now, when the time comes for "turn over," TRS-80 will pause for just a split second, then resume timekeeping correctly.

Otherwise, Mr. Hinrichs is to be commended on his fine application of the TRS-80's amazing Level II high speed graphics features.

Michael Sullivan
Box 90
DeKalb, Ill.
60115

Sorcerer As a Terminal

Dear Editor:

The Sorcerer's serial data cable (Exidy part number DP4005) is not enough to connect an accoustic coupler to the Sorcerer computer. It has no RS (request to send) line which is essential to the communication between a terminal and a host computer.

There is a +12 volts pin (#9) on the Sorcerer's serial interface, so I conntected it to the #4 pin (RS) pin of an acoustic coupler with wire and 1KΩ (1/4 W) resister. By this modification I succeeded in using the Sorcerer as a computer terminal.

Also, the Sorcerer dumb terminal program (supplied on cassette) has two defects. First, it doesn't select parity, the number of stop bits and the number of bits per character. Second, when the number of received characters per line from a host computer exceeds 64, the rest of the line is not printed on the CRT screen. But one can easily correct these defects by inserting some machine instructions.

Kazuo Nakamura
5-2-1-1402 Oji Kita-ku,
Tokyo, Japan 114

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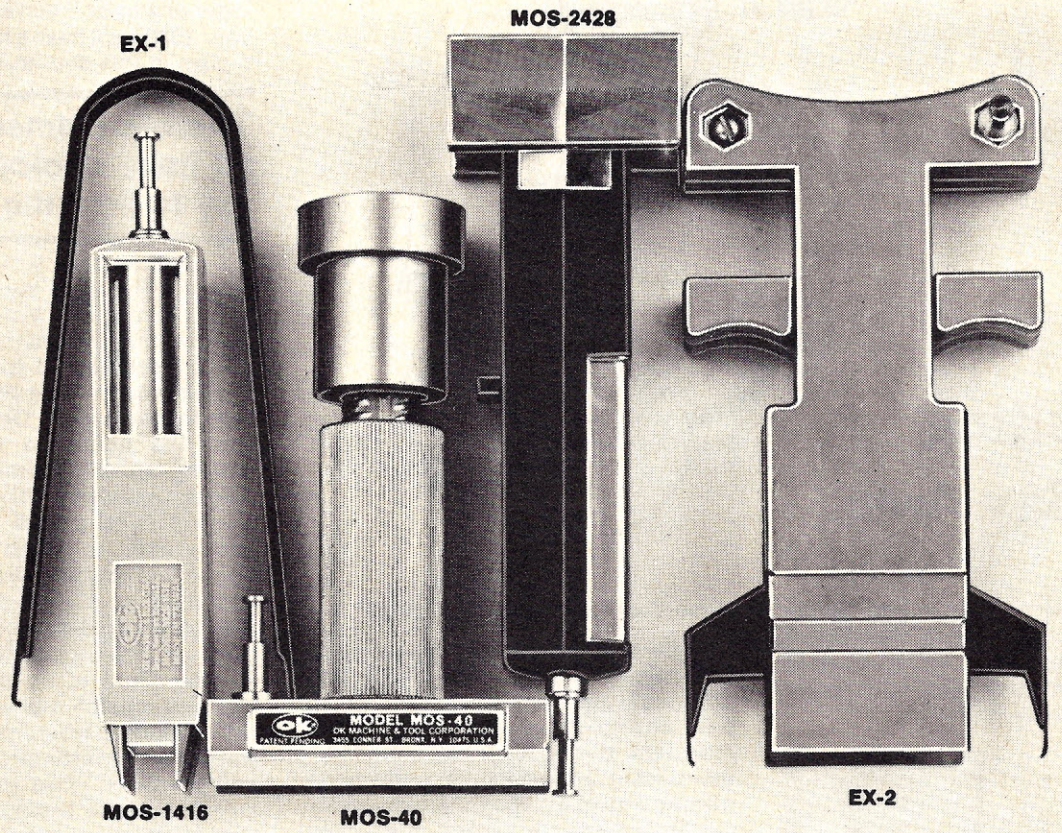

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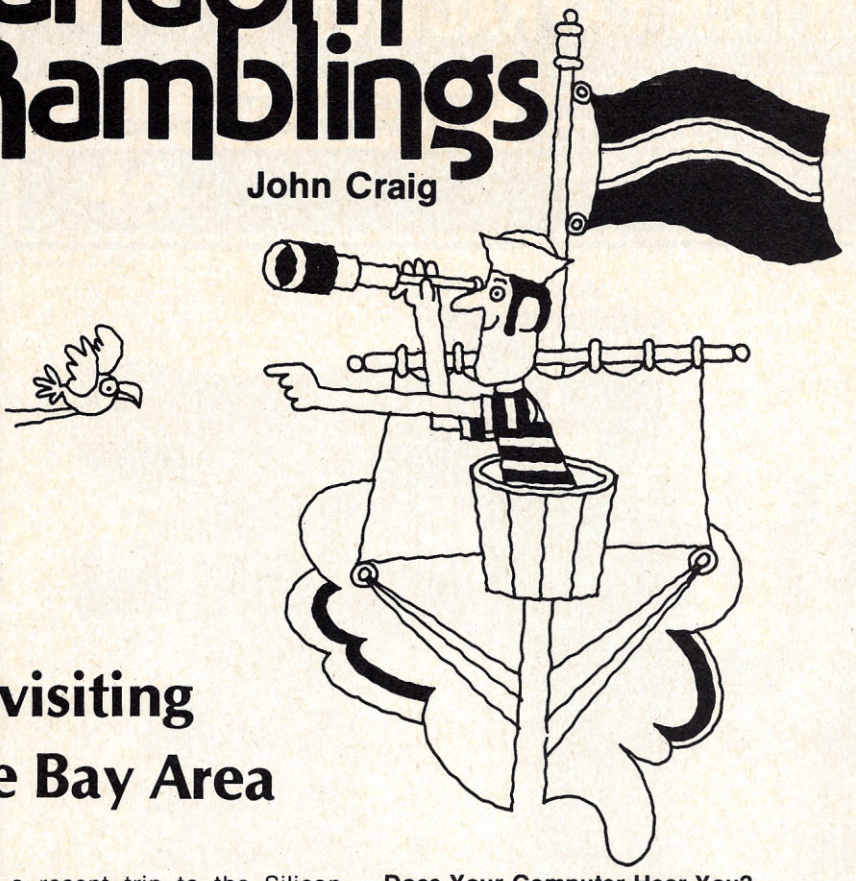
CIRCLE 173 ON READER SERVICE CARD

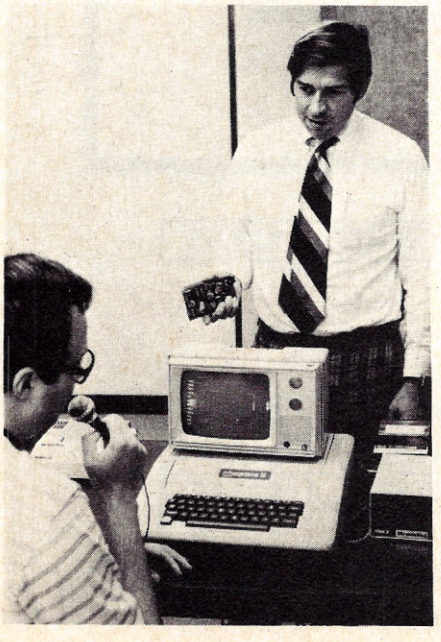
Random Ramblings

John Craig



Revisiting the Bay Area

On a recent trip to the Silicon Valley we stopped in to visit several companies that are doing some exciting things. We think you'll find them as interesting as we did.



Tom Tisch, the President of Heuristics, is shown holding the H-2000 Apple Speechlink while an associate demonstrates the system.

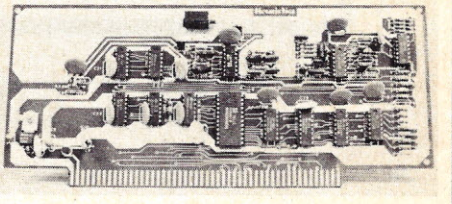
Does Your Computer Hear You?

When is the last time you sat down and talked to your computer? Undoubtedly there are times when we all have choice things to say to the little monsters, but now we can also make them listen. Heuristics, Inc., has been making a speech recognition board for S-100 systems for several years now and they've recently announced a new set of boards for the Apple II. (They also make a voice recognition unit which is sold in the retail stores of a major manufacturer of personal computers.)

Before this decade is out we're going to be seeing and hearing a great deal from this technology of speech recognition and speech output. The idea of a totally speech-controlled system is not out of the realm of possibility even with today's technology. Can you imagine an operating system which, upon powering up, waits for a voice command? The operator says, "Load Accounts Receivable." The computer then responds, by synthesized voice, with, "Can't load. Please insert program disk in Drive A and data disk in Drive B." The operator corrects the oversight by inserting the correct disks. The computer then responds with, "Thank you," and proceeds to load the program. It then asks, "Please specify function — Create Record, Update, Billing, Totals, Merge to General Ledger or List." (We have a very talkative computer.) Perhaps the most fascinating application would be in word processing where someone actually dictates text to the computer, such as a business letter or a book. I can see it now, by the year 2030 we'll have a hard time finding typists in this country!

There are times when we all have choice things to say to the little monsters.

Another area which holds great potential is speech therapy. Heuristics has a program, Voiceplot, which displays an instantaneous graph of speech patterns (3 frequency bands and amplitude). The program is available for the Apple, TRS-80 and North Star and could be very useful in training small children to overcome speech problems. The child would speak a certain word into the microphone and the graph would be displayed on the screen immediately. The instructor, or speech therapist, could then take a grease pencil and draw the graph on the CRT as it should be and ask the child to try again, this time trying to match up with the grease pencil mark. It would be fascinating to watch the speech improve as a result of that feedback. This technique could also be used to teach correct accents in foreign languages.

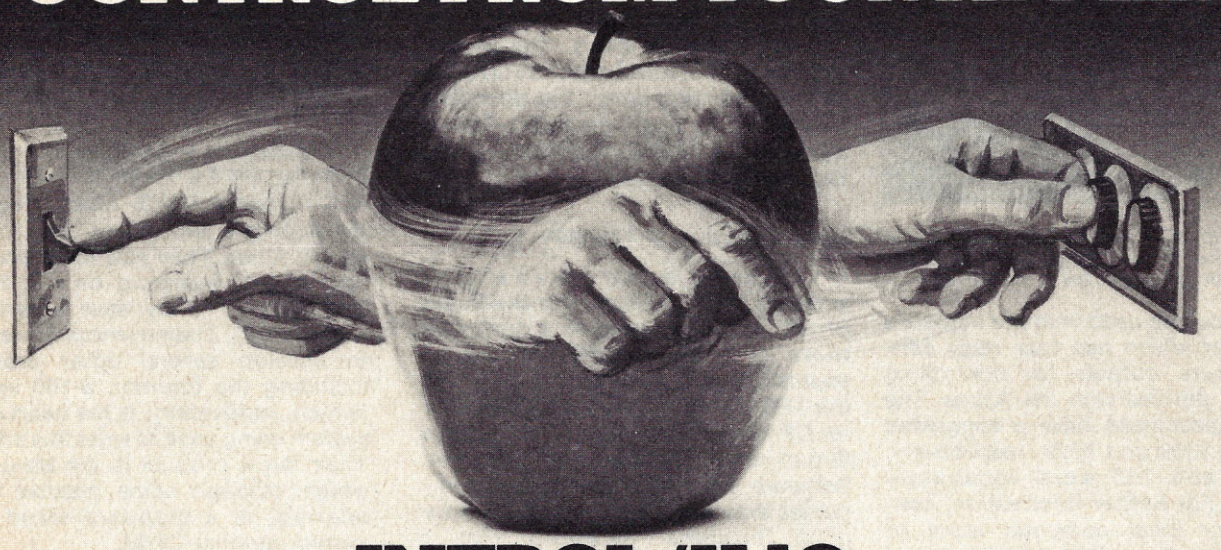


The latest version of the S-100 Speechlab board.

Many of Heuristic's Speechlab (S-100) and Speechlink (Apple) boards find their way into industrial applications. They offer a lightweight headset boom microphone for voice input while an operator is busy performing some chore with his or her hands. They've also developed a new standalone voice control unit, the Model 1600 Controller, which can control up to 12 devices.

The H-2000 Speechlink for the Apple has a suggested retail price of

NEW FROM MOUNTAIN HARDWARE. CONTROL FROM YOUR APPLE.



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Available through computer dealers worldwide

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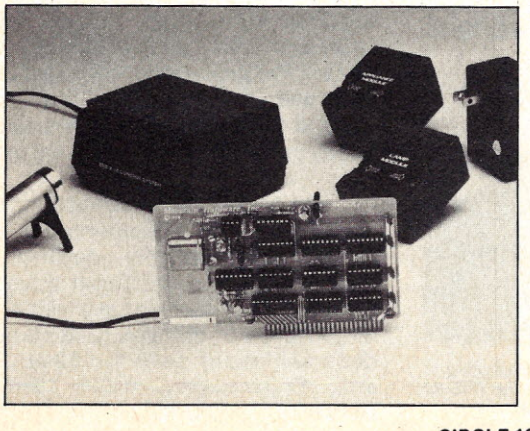

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Ramblings, con't...

The Corvus 10 megabyte hard disk system allowing itself to be photographed next to the relatively "puny" mini-floppy of the TRS-80.

$259. It can be used with the Model 70 controller which has four relay contact-closure outputs for controlling external devices with the Apple. The S-100 Speechlabs have a suggested retail of $399 and $599, respectively, for 64 and 255 word vocabulary models. For further information, contact your local computer store or Heuristics, Inc., 1285 Hammerwood Ave., Sunnyvale, CA 94086.

Newsflash! Solution to the Hard Disk Backup Problem

Several Winchester technology hard disk systems have been announced recently. They have undoubtedly opened up new business markets because of their relatively low cost and high capacity. However, there has been the nagging problem of how to effectively back up one of these little giants. It's possible to assign a person the task of spending several hours to back up a 10 megabyte drive with 8" floppy diskettes (and I wouldn't even consider it with the small 5" diskettes). There have also been a couple of 3M cassette drive systems which cost from $1900 to $3000 and can back up a 10 megabyte disk in a matter of minutes. Or, you could buy a second hard disk for backup and spend 3 or 4 thousand extra dollars in the process.

Corvus Systems, Inc., has come up with a unique, practical and low-cost solution to the problem. They've developed additional hardware and firmware, which sells for approximately $790 and works in conjunction with their controller so that a video tape recorder (VTR) can be interfaced to the hard disk. The entire 10 megabyte hard disk can be dumped to the VTR in *10 minutes*. So there you have a fast, and presumably reliable, backup system which consists of $790 worth of hardware and a $700 VTR for a total cost of about $1500.

Corvus has been running ads for some time which depict their 10 megabyte IMI-7710 Winchester hard disk sitting next to an Apple. As a result, I was left with the impression their drive was for the Apple and missed the point that it was also available for the TRS-80, S-100 (CP/M) and LSI-11 systems. Therefore, we took a photo of the drive sitting next to a TRS-80 to help make that point in case you missed it too. The system sells for $5350 (with an add-on drive for $2990) and runs under the operating system of the host computer. Corvus Systems, Inc., 900 S. Winchester Blvd., San Jose, CA 95128.

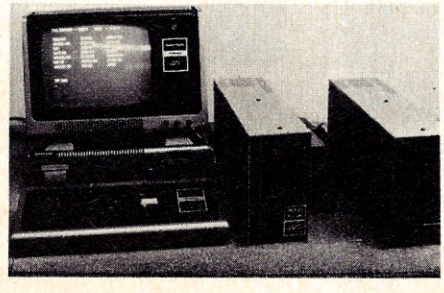
More Than Just A TRS-80?

Without a doubt, there's a lot of software floating around for the Radio Shack TRS-80. However, I don't feel there is a significant amount of sophisticated business software for the TRS-80 compared to that available for CP/M systems. Structured Systems Group, Graham-Dorian and Peachtree Software are just a few of the companies that have developed some very good business packages that I wouldn't be afraid to implement in a business of my own. And, that's not intended as a disparagement toward the people who have put together

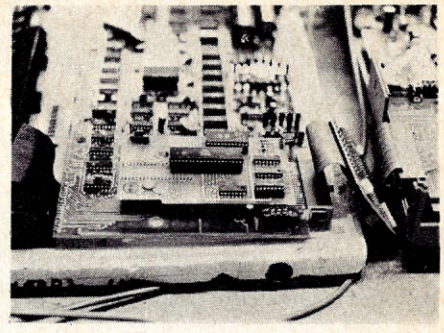
The installation of the boards is as easy as changing a tube in a TV. However, that statement can be misleading.

business packages for the TRS-80. It's just that those programs have been designed to work within the constraints of the system. Even Radio Shack realized the shortcomings of the Model I for business applications and that's the reason they came out with the Model II with standard-sized floppies.) Now, thanks to Parasitic Engineering, serious TRS-80 based business systems can be put together with 8" drives and CP/M.

Howard Fullmer and Gene Nardi started Parasitic Engineering way back



The Parasitic Engineering Maxi-Disks working in a "mixed & match" configuration with the TRS-80 minis . . . running TRS-DOS or CP/M.



The Shuffleboard which makes it all possible. Plugs right into the TRS-80 Z80 socket.

in the early MITS Altair days by developing a clock-fix board for the erratic Altair. They saw themselves as "parasites" jumping on the S-100 "bandwagon" (they have a sense of humor, too). They eventually went on to develop several other products including the Equinox S-100 system (which, incidentally, is the heart of the system being used to write this article). Their latest product is the Maxi-Disk which, through some creative engineering, is a standard-sized disk system running CP/M.

The problem confronting Parasitic in designing this adaption was that the TRS-80 uses lower memory for several things, such as the memory-mapped video, and CP/M also operates in lower memory. Quite simply, they designed a board, called the "Shuffleboard," which plugs into the TRS-80's Z80 socket and causes the lower 16K to be released for use as RAM. Another "piggy-back" board contains a new disk controller chip and plugs into the disk controller socket in the expansion interface. This allows for running mini-drives, with TRS-DOS, along with standard (Maxi) drives and CP/M, or just one or the other. In both cases, the installation of the boards is as easy as changing a tube in a TV. However, that statement can be misleading. A friend of mine "simply" plugged the boards in and has had some difficulty in getting the system up. Parasitic has been extremely helpful but there is only so much that can be done over the phone. At last word, my friend was getting together with fellow TRS-80 owners to do some swapping around to determine if the problem is in his expansion interface, the boards or the TRS-80 itself. It is hoped the problem will turn out to be something simple — it usually is.

The Maxi-Disk drive sells for $995, which includes a Siemens FD 100-8 drive, power supply, cabinet and interface board. Additional drives are $845 and the Shuffleboard with a copy of CP/M on 8" diskette (and complete documentation) sells for $249. Parasitic Engineering, 1201 10th St., Berkeley, CA 94710. □

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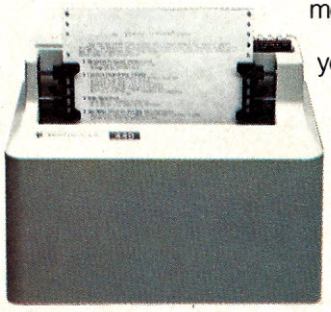

The Paper Tiger costs only $995. The DotPlot option only $99 more. But don't let these low prices fool you. Because the Paper Tiger is rugged enough to stand up to the most demanding printer-plotter requirements.

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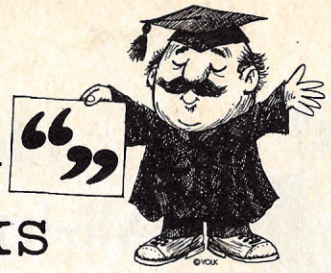
Effective Writing

David H. Ahl

Quotations and 'Quotation' Marks



Quotations and 'Quotation Marks'

In writing directions for the use of a program suppose you want to say:

For help, type "HELP".

Standard grammatical convention would place the period inside the quotation marks. However, the command you wish to be typed into the computer is HELP without a period and indeed the period could alter the command. What to do? The obvious solution is to depart from standard convention and type it as in the example above. Another solution is to recast the sentence, for example:

Type "HELP" if you need help.

Another possibility, if the material is going to be typeset, is to show input and output to the computer in a different typeface:

For help, type **HELP.**

Sometimes that approach isn't all that helpful. For instance, can you easily tell if the period is bold (and part of the command) or not?

Furthermore, for showing computer input and output together in a sample program run, it is frequently desirable to differentiate input from output. The easiest way to do this is with an underline.

```
HI!  I'M ELIZA.  WHAT'S YOUR PROBLEM?
? YOU
WE WERE DISCUSSING YOU-- NOT ME.
? BUT YOU ATR THE PROBLEM
OH, I ATR THE PROBLEM
? SO I MISSPELLED A WORD
SAY, DO YOU HAVE ANY PSYCHOLOGICAL PROBLEMS?
? NO DO YOU
YOU'RE NOT REALLY TALKING ABOUT ME, ARE YOU?
? ONLY BEHIND YOUR BACK
WHY ARE YOU CONCERNED ABOUT MY BACK
? BECAUSE I'M AFRAID TO CON FRONT YOU
DID YOU COME TO ME BECAUSE YOU ARE AFRAID TO
   CON FRONT I
? YOU SPEAK WIERD ENGLISH
WE WERE DISCUSSING YOU-- NOT ME.
? AM I GETTING THE BEST OF YOU
OH, I
? WHAT IS THAT SUPPOSED TO MEAN
WHY DO YOU ASK?
? WHY NOT
```

In this example perhaps the input was clear enough without an underline because it always followed a question mark, however if GET statements had been used or the input prompt had not been printed, then an underline or other differentiation would have been vital.

Quotations

Indirect quotations and paraphrases are treated no differently from one's own thoughts and do not require quotations marks. Of course, the other source should be acknowledged.

Direct quotations, on the other hand, call for special treatment. A quotation of average length (fewer than 50 words) is generally worked into the regular text. It is included in a line begun or ended by one's own words and marked by quotation double marks. If the excerpt is a sentence by itself, the first word is capitalized and separated from other text by a comma or colon.

If the excerpt completes a sentence, the capital and punctuation are omitted. To omit a part of the quotation, suspension points — also called ellipsis points — mark the omission. These are three consecutive spaced periods and can mark the omission of one word or several sentences. If the omission is at the end of a sentence, four spaced points are used. For example:

> As noted in the Hart article, the random number generator "starts a new sequence . . . and returns the next random number in the sequence with a positive argument."

Quotations more than 50 words long are generally set apart from the regular text. The excerpt is preceded and followed by a blank line and quotation marks are not used. As an example of this, *The New York Times Manual of Style and Usage* states:

> The period and comma should be placed inside quotation marks . . . The colon and the semicolon are placed outside: *He defined "work-week": the average number of hours worked weekly by the men in his factory.* Question marks and exclamation marks may come before or after the quotation marks, depending on the meaning: *The crowd shouted, "Long live the king!" Just imagine, he was afraid of "elephants without trunks"! "Who are these 'economic royalists'?" he asked. Have you read "Lord Jim"?*
>
> In continuous quoted matter that is more than one paragraph long, place a quotation mark at the beginning of each of the paragraphs and at the end of the last paragraph only.

Other Uses of Quotation Marks

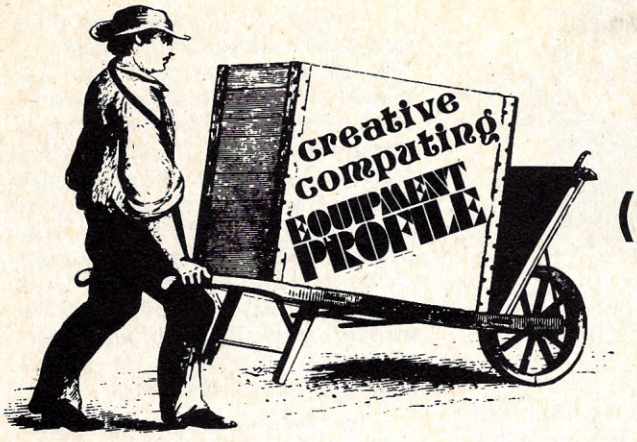
Quotation marks are also used to denote words used in a special way and slang when it is introduced into formal writing. Two examples follow. One of the PC boards was "decrudded" with ammonia and rubber cement solvent. "Quotes" is slang for quotation marks.

Quotation marks are used to enclose titles of short poems, short stories, articles, lectures, chapters of books (but not book titles), songs, and radio and TV programs. "Don't Bother Me, I'm Learning" was an excellent special recently aired on PBS.

Quotation marks may be used to denote letters, numbers, words, and phrases used apart from their meaning. For example, loop the "9" more distinctly, cross the "t," omit "very."

Lastly, quotation marks have begun to be used to show disdain. This use is not discussed in any style guide as far as I know. Henry L. Trewhitt of The Baltimore Sun calls these "cop-out quotation marks" — when a writer uses a bit of jargon or a colloquialism and encloses it in quotes to show he really knows better. A related use is to put a "snear" connotation on a word. Thus, the terrorists at the U.S. Embassy in Iran are referred to as "students." World Book Dictionary editor Sol Steinmetz thinks that "disbelieving quotation marks" first became popular during the Nazi era, and then were given a boost in the Vietnam years, especially around the word "advisors."

Last but not least, avoid cliches like the plague; seek viable alternatives and "avoid overuse of 'quotation "marks."'" □



Heathkit WH-89 (All-in-One) Computer

Randy Heuer

Heathkit has long been known as a manufacturer of quality electronic kits. Several years ago, Heath brought out their first two computer kits. Frankly, I found these initial machines somewhat disappointing. Perhaps being familiar with the innovative features introduced by Heath in many of their other electronic kits I expected too much from their first computers.

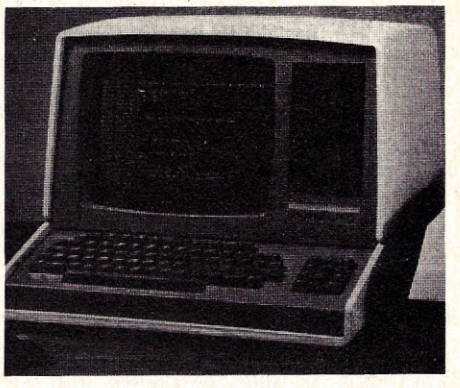
I'm happy to report that Heath has once again introduced an innovative electronic component and this time it is a computer. The WH-89 is a Z-80 based microcomputer in the same class as TRS-80, Apple and PET with the potential to give these systems a run for the money.

Hardware

The WH-89 is nicknamed the "All-in-One," since the keyboard, video display and disk drive are all contained in the same cabinet. The unit is nicely styled and, after getting used to multiple wires and cables hanging out all over the place on other computers, the single wire to the wall socket was a refreshing change.

The unit is probably the most professional looking of any of the popular microcomputers on the market today.

Actually, it would be incorrect to lead people to believe that all one has to do is plug the unit in and start programming. The WH-89 is the assembled form of the computer, but the accessories (additional memory, serial I/O board and cassette interface) come in separate boxes and require various degrees of assembly. Additional memory is simply plugged into the logic board and a few jumpers are changed. On the other hand, the cassette interface requires soldering and assembly of cables. Although no major construction is necessary to install these accessories, some people may feel put-out to have to do this work.



The unit itself is probably the most professional looking unit of any of the popular microcomputers on the market today. Housed in a heavy plastic shell, the unit looks more like a mainframe console terminal than a home computer. The keyboard is of professional quality, featuring a full, standard typewriter keyboard and a numeric keypad. Each time a key is pressed, the speaker inside the cabinet clicks providing a confirmation of each entry.

The video monitor is one of the finest available on any microcomputer today. The screen is easy on the eyes and the characters are very sharp. It measures 12" diagonally and displays 25 rows of 80 characters. Each character is formed by a 5 x 7 dot matrix except for some graphic characters and lower case characters which employ descenders and use a 5 x 9 matrix.

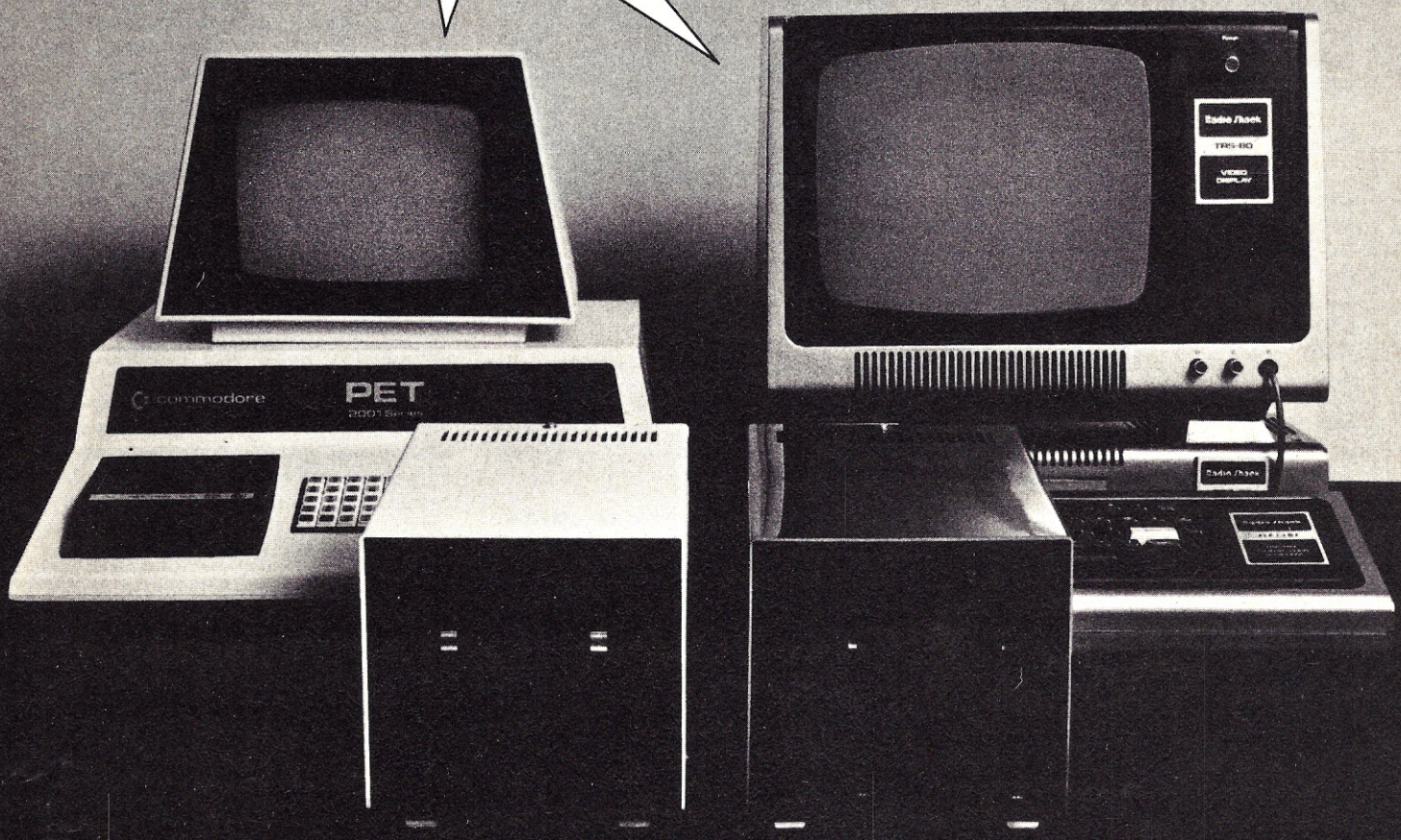
The disk drive is a Wangco 82, 5¼" drive. It is mounted in the cabinet adjacent to the monitor. Each diskette holds 102K bytes of information on 40 tracks.

What makes the WH-89 different from most other microcomputers is that instead of having a single microprocessor, the WH-89 has two. One Z-80 functions as the main processor would in any computer. The other Z-80 controls the terminal functions, thus making it a "smart terminal." As a result, the CPU is not burdened with the task of handling screen functions. The Z-80 in the terminal handles cursor addressing, character insert and delete, graphics and video inverse. Among many other special purpose functions are two unique screen functions, cursor memory and a 25th line.

Cursor memory allows the terminal to "remember" the position of the cursor from a previous time. This function is implemented by moving the cursor to the desired location and then entering an escape character via the keyboard or the program. Then at a later time, after the cursor has been moved elsewhere any number of times, another escape character can be entered to restore the cursor to the memorized location.

The 25th line is another interesting and unique feature. Normally only 24 lines of text are presented on the screen. The bottom (25th) line is not used. This bottom line can be activated and printed on. However, unlike the other 24 lines, this line does not scroll but remains at the bottom of the screen. Thus special instructions, help statements, etc. can be written on this

THANKS FOR THE MEMORIES.



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☐ Pet Expandamem™ ☐ 16k ☐ 24k ☐ 32k
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Freight pre-paid in continental U.S.
Dealer Inquiries Invited.

Name _____

Address _____

City _____ **State** _____ **Zip** _____

CIRCLE 135 ON READER SERVICE CARD

Heathkit, cont'd...

line and will remain at the same position on the screen regardless of what other screen formatting is done. The 25th line can be erased by a special escape character.

Hardware is only one part of a computer system. The other important component is the software. Since the combination of these two parts determines the quality of the system as a whole, let's take a good look at the software presently available for the WH-89.

Software

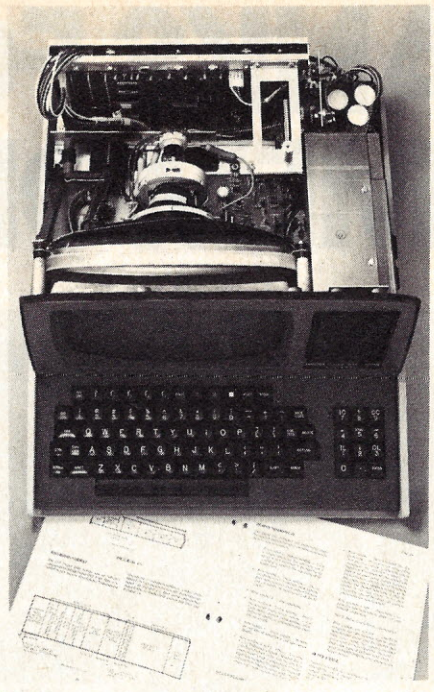
Another one of the differences between the WH-89 and other popular microcomputers is the amount and usage of Read Only Memory (ROM). In the Apple, PET and TRS-80, as much as 12K of the memory is ROM and contains the higher level language, Basic. Not so in the WH-89. Only 6K of memory is ROM and this is used for the bootstrap program, system monitor and other special functions. Thus all of the higher level features must be provided by the software as opposed to the firmware in ROM.

Hardware is only one part of a computer system. The other important component is the software.

This arrangement has advantages and disadvantages. The major advantage is that the user is no longer confined to doing most of his programming in the language provided, but may use any language which can be loaded into the computer RAM and supported by the system. The major disadvantages are that the operating system and higher level languages (Basic) take up a significant amount of RAM and that you are very dependent on the quality of this software. Since most people don't have the ability to write their own systems software, they have to rely on software provided by the manufacturer or other sources.

Heath provides system software for the "All-in-One" in two forms. One is for the simpler, cassette-based system. For $20 you can receive a package containing Benton Harbor Basic, Heath Assembly language, text editor and console debugger. This certainly seems adequate for getting started on the "All-in-One."

Most users of the "All-in-One" will probably prefer to use the disk-based systems software. The "All-in-One" uses the Heath operating system called HDOS. Developed for the Heath H-8 computer, this software has been adapted for use in the WH-89, HDOS bears a greater resemblance to the CP/M operating system than the operating systems of TRS-80 or Apple.



The Heath Data Systems WH89 is a totally integrated microcomputer system contained in a compact, desk-top terminal that supplies all of the computing power needed for most small business or professional tasks. It is shown here with cover removed.

With the system disk, which costs $100, you receive Benton Harbor Basic, an assembler routine, text editor, console debugger, a set of utility programs, and manual. HDOS is fairly complete and easy to use. The first chapter of the manual leads the user through the process of initializing and SYSGENing new diskettes, using the one drive copy utility, and writing and saving programs. It's intended for the first time user and should help the novice understand how to get started with the WH-89.

Users will probably want a higher level language than assembly language for most programming tasks. While Benton Harbor Basic may be adequate in some cases, most people will prefer the more popular and powerful Microsoft Basic (MBasic). This language is available on diskette for an additional $100. This is the same diskette sold for the H-8 system and therein lies a deficiency with this release. There's a lack of easy and direct access to the smart terminal functions and graphics from this language. These special features can be accessed only in a roundabout way by use of ASCII codes and the CHR$ function. For example, to clear the screen one must write a statement such as PRINT CHR$(27);CHR$(69). This is not as easy as the CLS or PRINT AT features of the TRS-80.

In addition, there apparently exists a memory allocation problem between HDOS and MBasic such that memory protection for machine language subroutines cannot be guaranteed. As a result, Heath recommends that the USR function not be used with this release of MBasic. Heath has promised that all registered purchasers of this version of MBasic will receive the update that corrects this problem in early 1980. So perhaps by the time this article runs this problem will have been solved.

It would be in Heath's best interest to "tailor" their Basic to the "All-in-One." Most users of the WH-89 will not be able to make maximum usage of graphics and the terminal functions with the present form of MBasic. If Heath really wants to compete with the machines popular with the home and general user market (TRS-80, Apple, etc.), they'd be very wise to update MBasic to "fit" the WH-89. Users with all levels of programming skills would appreciate an easy method for interacting with the special features of the machine as those features are generally superior to other small computers.

What Does It Cost?

Well, it depends on what you want to buy. Basically there are three ways to purchase the "All-in-One." One is the kit version without the floppy disk system (H-88). A 16K machine with a cassette interface sells for $1195. Of course you'll need to invest an additional $20 for the system software and probably will want an additional 16K of memory for $150. Total $1365.

It would be in Heath's best interest to "tailor" their Basic to the "All-in-One."

If you want a disk-based system and are willing to do a bit of assembly, a 16K kit with a Wangco disk drive costs $1595. This kit (H-89) includes the cassette interface. In addition, you'll need the disk-based system software ($100) and at least 16K additional memory ($150). If you intend to write large programs using the optional Microsoft Basic ($100), you'll need another 16K expansion kit ($150) as in a 32K machine only 6K of memory remains after loading Basic and HDOS. Total $1845 to $2095.

Heathkit, cont'd...

Finally, the fully-assembled version of the disk-based system (WH-89) costs $2295. This version is an assembled H-89 minus the cassette interface. The additional costs for software and memory expansion for the WH-89 are the same as the H-89. Total $2545 to $2795.

The only other accessory available for the "All-in-One" is a two port serial I/O board for $85. An H-88 without a disk drive can later be upgraded to a disk-based system with the purchase of a disk drive for $450 and the appropriate software.

The best buy of this group is probably the H-89. This system entails a fair amount of assembly (although the CPU is completely wired and tested), but if you can take the time and care to assemble a kit, the savings of $700 (plus a cassette interface) certainly seem justified. If I were purchasing the system, I would add 32K more of memory ($300), the serial I/O board ($85), the HDOS systems software ($100) and Microsoft Basic ($100). Thus the total price of the system is $2190. This may seem like a lot of money, but it compares favorably to a TRS-80 or Apple with similar features.

Is The "All-In-One" For You?

As with any computer system, the answer depends upon what you want in a computer. If you are looking for a machine with a large amount of software presently available and geared mainly toward personal use, then perhaps you'd do better to look elsewhere. However, if you are interested in acquiring a computer with a great potential for sophisticated applications, it would be worth your while to take a good look at the "All-in-One."

If you are interested in acquiring a computer with a great potential for sophisticated applications, it would be worth your while to take a good look at the "All-in-One."

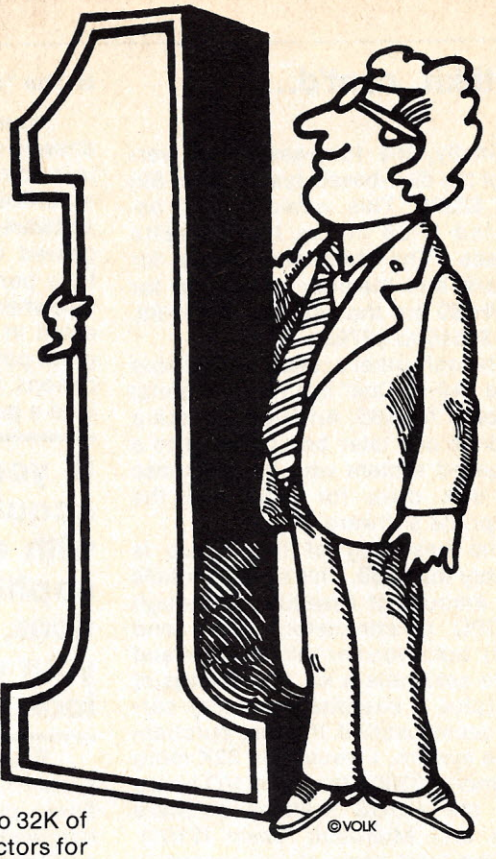
Based on a comparison with other systems, the "All-in-One" is one of the finest pieces of complete computer hardware in the less than $3000 class available today. This system combines the ease of use of the home computer with some of the features found in the more complex, S-100 based systems. However, there is very little provision for expansion outside of the peripherals available now, so users wishing to add accessories such as music boards and color graphics should probably consider another system. Basically the "All-in-One" is intended to be a single disk drive, 48K machine with provisions for a printer and a cassette unit. A large percentage of users and potential users of a small computer system will find this amount of hardware adequate for their needs.

The "All-in'One" has an excellent start toward becoming a major force in the small computer market. Its sophisticated hardware gives it an advantage over most other small computers. The key for making it a complete winner is the development of equally sophisticated software. The HDOS systems software is good. The Microsoft Basic available for the "All-in-One" is adequate but needs to be specifically tailored to the "All-in-One" before most users will be able to take full advantage of the hardware. If Heath or some other software source develops another high level language (such as Pascal) and perhaps a screen-oriented word processing system (a la Electric Pencil) for the "All-in-One," this computer can have a major impact on the small computer market. □

Atari & PET Compared

Atari In Perspective

Len Lindsay



Since I own and use both an old and new style PET, and have just acquired an Atari 800, a question I often hear is "Which computer is the best?" A good reply is "Best for what?" Note that this article is not titled Atari vs. PET, for this is not a contest, but a comparison. It is up to you to pick out the qualities you think are important for your future uses. I used a 32K PET 2001 new ROM with large graphic keyboard and a 24K Atari 800 for this comparison.

Conflicting information here and there prompted this comparison. I hope others will compare other computers, for it will help put a perspective on home computers. (How about Apple and Atari compared?) I will describe some significant aspects of each computer, and report results of similar test programs run on each. At times it may seem that I include a bit more about the Atari or leave out some PET qualities. This is because I wish to focus on Atari using the PET as a comparison (there is a lot already printed about the PET, while the Atari is a newcomer and not familiar to many). Also, I am sure that many differences and similarities are missed due to lack of space to say it all. Your comments are welcome.

The PET is one unit, designed as an all-in-one package theme. The original PET was complete in one unit, while the newer style does require the cassette to plug into the back of the main unit. The Atari is component oriented, with the computer and keyboard as one central unit. It plugs into an ordinary wall socket (there is a small power supply unit half way from the computer to its plug). The cassette player plugs into the wall socket and into the computer. The central unit must then be connected to a TV or video monitor (an RFM adapter is supplied that connects to the antenna terminals of your TV). Thus, the Atari has a few more cables and wires to worry about.

Len Lindsay, 1929 Northport #6, Madison, WI 53704

The PET can address up to 32K of RAM. There are built in connectors for the IEEE bus, a parallel port, cassette #2 and memory expansion. Commodore does not supply memory expansion boards but they are available from independent companies.

The Atari can address up to 48K RAM. There are built-in connectors for joysticks and game paddles, video monitor out, power in, peripheral expansion, ROM cartridges and RAM modules. 8K and 16K memory expansion modules are available from Atari and there are 3 sockets available for these memory modules. A 10K ROM pak is plugged in front of these memory modules. In front of these are two smaller sockets for other ROM cartridges such as the Basic interpreter, Educational System cartridge, and other software in ROM cartridges.

This is not a contest, it is up to you to pick out the qualities you think are important for your future uses.

A second tape unit can be added to the PET using the second cassette plug. The cassettes are digital and are preset for optimal performance. IEEE peripherals can be added via the IEEE port, including disk and printer. The parallel port can support joysticks, lightpens, printers, speakers, etc., but these must be added by the user. The memory expansion port can also be used to connect to a disk system.

Peripherals, including cassette, printer and disk, plug into Atari's peripheral expansion plug in a daisy chain fashion. A video monitor and standard TV can be used simultaneously since there are two separate connections (ideal for a classroom — you can face the class and see your monitor, and have a large TV for the class to see at the same time). The cassette can be used for both digital and audio recording with the volume preset for best results (the audio output comes through your TV speaker and its volume can be adjusted with the TV volume controls). You can load a program as well as use verbal instructions on the tape. The cassette has a 3 digit counter.

The PET has a 74 key keyboard including a numeric keypad. Special keys include REVERSE ON/OFF, SHIFT LOCK, RUN/STOP, HOME CURSOR, CLEAR SCREEN, CURSOR UP, DOWN, LEFT & RIGHT, INSERT and DELETE. The PET can operate in either graphics or lower case mode. Graphics are shifted letters and numbers. When in lower case mode the alphabetic keys become upper and lower with their corresponding graphics unavailable.

The Atari has a 61 key keyboard. Special keys include REVERSE ON/OFF, ESCAPE, BREAK, CONTROL, TAB, TAB SET/CLEAR, CAPS LOCK, CURSOR UP, DOWN, RIGHT & LEFT, CLEAR SCREEN, INSERT CHARACTER/LINE, DELETE CHAR-

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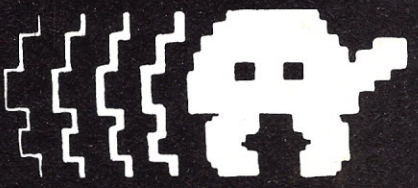

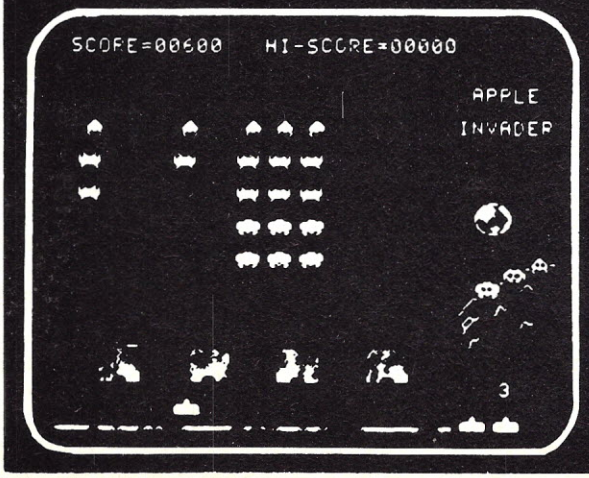

Fifty-five aliens advance and shower you with lethal writhing electric worms. As you pick off the aliens, one-by-one, they quicken their descent. They whiz across the screen wearing away your parapets, your only defense, coming closer and closer to your level. **Super Invasion** is the **original** invasion game with the original moon creatures and faster action than any other invasion game on the market.

Super Invasion is available for only $19.95 on cassette (CS-4006) for a 32K Apple II. **Space War** is $14.95 on cassette (CS-4009) for a 16K Apple II. **Space War** and **Super Invasion** are on one disk (CS-4508) for a 48K Apple II for only $29.95.

Send payment plus $1.00 shipping and handling to Creative Computing Software, P.O. Box 789-M, Morristown, NJ 07960. NJ residents add $1.00 sales tax. Bankcard orders may be called in toll free to 800/631-8112. In NJ call 201/540-0445.

sensational software

creative computing software

Atari, cont'd...

ACTER/LINE and BACKSPACE. A similar set of graphics is available from the keyboard as with the PET. However, other graphics are available as well by plotting. Hold a key down for a second and it begins a fast repeat action, excellent for special key functions such as cursor movements. And like a typewriter, the unit will beep when you are almost at the end of the line.

Both the Atari and PET allow special key functions to be written into your program (i.e., your program can move a cursor around, etc.). Both have excellent screen editing. The PET video output is only black and white, while the Atari is in full color. It has 3 different text modes plus 6 graphic modes, including high resolution with many Basic commands for color control and plotting and drawing lines. In text mode 0, text can be displayed normally with 24 lines of 40 characters each. Text mode 1 prints double width characters (24 lines of 20 characters). In text mode 2, the letters are double height as well as double width (12 lines of 20 characters). The text can be in varying colors. A four line text window is also available while in text modes 1 & 2 and all graphic modes. The several graphic modes allow for varying resolution. The higher the resolution, the more memory is used by the operating system to keep track of the screen display. Highest resolution is 320 x 192 (and this mode requires your Atari to have 16K RAM). Atari also has a small beeper built in, and access to sound, 4 voices, almost 5 full octaves, plus tone control (including special effect noises such as a buzzing sound). Joystick and game paddle commands are built into Atari Basic as well as random access disk commands.

There is a lot already printed about the PET, while the Atari is a newcomer and not familiar to many.

PET Basic is by Microsoft, often referred to as the industry standard. Atari Basic is not by Microsoft, but is Shepardson Basic, supposedly by those who brought you Cromemco Basic. Both are similar in many aspects, and I will leave benchmark timings to someone else. Both use the question mark "?" as an abbreviation for PRINT. Both allow you to OPEN and CLOSE files to various devices.

Having a Basic interpreter done by Microsoft is a real convenience since most program listings in magazines or books are most compatible with it.

Variable Names

Now on to my comparative test programs and their results. I will begin by testing what names can be used for variables. Here is the first program I tried on both computers:

```
10 AZAZAZ=12
20 PRINT AZ
30 PRINT AZAZAZ

PET RESULTS  : 12
               12

ATARI RESULTS:0
              12
```

The PET video output is only black and white, while the Atari is in full color.

Both let one use a six character variable name. The difference is that only the first two characters are significant to the PET, while every character is significant to the Atari.

Next I tested numeric characters as part of the variable name with this program:

```
10 A1=10
20 A12=20
30 PRINT A1,A12

PET RESULTS  :'20'''''''20
              (the ' denotes a space)

ATARI RESULTS:10'''''''20
              (the ' denotes a space)
```

Both accepted numeric characters, and note that PET once again only used the first two as significant. Also note that they both have set tab points used when printing items to the screen separated with a comma. Then I tested the & symbol within the variable name:

```
10 A&=12
```

Neither computer accepted this. The PET accepted the line when entered, but when a RUN was attempted gave this message:

```
?SYNTAX ERROR IN 10
```

The Atari rejected it immediately after I hit RETURN with this message:

```
10 ERROR-  A&=12
```
(the & was in reverse field)

This points out a significant difference between PET Basic and Atari Basic. PET allows you to enter lines containing anything you wish. It only rejects a line as incorrect when it attempts to execute it. The Atari checks each line as it is entered and will immediately tell you if it finds an error.

How about lower case characters in the variable name? I tried this:

```
10 a=12
```

Neither accepted this. The Atari rejected it immediately with an error message. The PET gave its error message when it was RUN. However, the PET did accept AAa=12 with no apparent problem, indicating that it must have ignored the characters after the first two significant ones.

Now to test another area of conflict, can Basic keywords be used within variable names? The PET always gave a SYNTAX ERROR for the following programs, but the Atari varied in its response:

```
10 SCORE=20
20 PRINT SCORE
30 POINTS=12

ATARI RESULTS:20
              30 ERROR-  POINTS=12
```

It accepted SCORE as a variable and printed its value of 20 fine. But when I added line 30 to the program it rejected it with the error. Both of the next one line programs resulted in an error message:

```
1 END=12
```

and

```
1 LIST=12
```

The following program illustrates the danger of using Basic keywords, even if Atari Basic lets you:

```
10 B=0
20 NOTB=2
30 PRINT NOTB
```

The Atari printed 1 as the answer. Thus you see that the Atari accepts Basic keywords **sometimes!** And then again, other times it just might not. My advice would be — **never use Basic keywords as part of a variable name** (it's safer that way).

From these tests we can say both allow more than one character to be used, but the first character must be upper case alphabetic and the rest must be either numeric or upper case alphabetic. Neither safely allows the use of Basic keywords as part of a variable name. The Atari accepts every character in your variable name as significant, while the PET only uses the first two characters as significant (and ignores the following ones).

Subscripted Variables

I then compared the use of subscripted variables. Both accepted

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Atari, cont'd...

A(1)=12. The Atari accepted A(12)=24 while the PET gave a BAD SUBSCRIPT ERROR (any subscript over 10 must be DIMed first). The Atari accepted A(12,12)=234 (PET once again gave the error message). The PET accepted A(1,1,1)=123 while the Atari gave the message: ERROR A(1,1,1)=123 (with the second comma in reverse field). However, the PET did not accept A(1,1,1,1)=123 and gave an OUT OF MEMORY error (I did a PRINT FRE(0) and had 31706 free bytes).

Thus, I would conclude that the PET will allow up to a triple subscript. All must be DIMed if any of the subscripts will be over 10. The Atari will allow up to a double subscript, and the DIM question needs further investigation.

Variables Cleared With A Run?

While we are looking at variables, I tried this program on both computers:

```
10 DIM A(3,3), B(4)
15 DIM D$(4) : REM (this line needed for the ATARI only)
20 PRINT A(3,3), B(4), C, D$
30 A(3,3)=5 : B(4)=5 : C=6 : D$="TEST"
```

The first time the program was run, both computers gave the same results:

```
0     0     0
```

However, a second RUN, done immediately after the first, gave these results with the Atari:

```
5     6     0
```

Neither safely allows the use of Basic keywords as part of a variable name.

PET still gave all zeros. This means that when a program is RUN all variables are cleared in the PET. Arrays are not cleared in the Atari, however, and this must be kept in mind.

Get One Character

Although both Atari and PET have the GET command, there is a distinct difference in its use. For example:

```
10 GET A

20 PRINT A
```

Atari gives an error, while the PET prints 0 (it looks at the keyboard for a blink of an eye, sees nothing, and thus goes to line 20 and prints a 0, for it hasn't assigned a value yet). The following program shows correct use of GET for the Atari:

```
10 OPEN#2,4,0,"K:"

20 GET#2,A

30 PRINT A
```

When run on the Atari, it waits until you hit a key, then prints the coded value of the key hit. For example, I hit T and it printed 84. I hit U and it printed 85. This is very different from the PET which looks only once at the keyboard and, if a key was hit, it gets the character itself rather than the coded value of it.

Wait Till A Key Is Hit Program: Both computers can be programmed to wait till a key is hit and then continue. A possible PET code is:

```
10 GET A$ : IF A$="" THEN 10
```

Possible Atari code is:

```
10 IF PEEK(764)=255 THEN 10
```

Keyboard Buffer: This brings up the keyboard buffer. As a test I ran this program:

```
10 FOR X=1 TO 9999 : NEXT X
```

Immediately after it was run I hit some keys. As soon as the loop is done the computer prints what is in the keyboard buffer. The PET could remember up to the last 9 keys I hit. However, if I hit a 10th key it forgot all of them, including the 10th key, and began over again as if no keys were hit. The Atari remembered only the last one.

Numeric Representation

PET and Atari use different methods of representing and printing numbers on the screen. (Did you notice the difference in output for the previous test on numeric characters within variable names?) I ran this program:

```
10 A=1

20 B=2

30 C=-3

40 D=-4

50 PRINT A;B;C;D
```

The semicolons mean that the cursor remains where it is after printing rather than executing a carriage return. Thus the values of A, B, C and D will be printed one after another.

```
PET RESULTS   :'1''2'-3'-4
                (the ' indicates a space)
ATARI RESULTS:12-3-4
```

The Atari appears to represent the number as we would: 1, is 1, if a negative sign is needed, it is included. The PET, however, appears to have a different strategy. It seems to represent a number thus: The first character is the sign (a - is printed if negative, or else a space is printed). Next, the number is printed. Finally, a cursor right is printed and the PET is done.

This would explain the difference in the printed output. Change the semicolons in line 50 to commas and these results are seen:

```
PET RESULTS  : 1     2    -3    -4

ATARI RESULTS:1      2    -3    -4
```

Both acknowledge the comma to mean skip to the next default tab position.

Next I tested how very large numbers would be printed with this program:

```
10 A=1234567891

20 B=1234567899

30 C=123456789123456789

40 PRINT A

50 PRINT B

60 PRINT C


PET RESULTS  : 1.23456789E+09
               1.2345679E+09
               1.23456789E+17


ATARI RESULTS:1234567890
              1234567890
              1.23456789E+17
```

Both computers use scientific notation and have 9 digit accuracy, with the PET rounding the last significant digit, and the Atari truncating it.

Looping — A Quick Look

I then tested how many nested FOR . . . NEXT loops each machine could handle:

```
1 FOR A=1 TO 99

2 FOR B=1 TO 99

3 FOR C=1 TO 99

4 FOR D=1 TO 99

5 FOR E=1 TO 99

6 FOR F=1 TO 99

7 FOR G=1 TO 99

8 FOR H=1 TO 99

9 FOR I=1 TO 99

10 FOR J=1 TO 99

11 FOR K=1 TO 99

12 FOR L=1 TO 99

13 FOR M=1 TO 99

14 FOR N=1 TO 99

15 FOR O=1 TO 99

16 FOR P=1 TO 99

17 FOR Q=1 TO 99

18 FOR R=1 TO 99

19 FOR S=1 TO 99

20 PRINT S,T

21
```

program would continue here with NEXTs as needed, but are not necessary for this test.

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Atari, cont'd...

```
PET RESULTS:?OUT OF MEMORY ERROR IN 11

ATARI RESULTS:1        0
```

The PET appears to only allow 10 levels of nested loops, while the Atari may be unlimited. Other tests showed that the PET will allow a simple NEXT while the Atari will not, requiring NEXT X (the loop variable must be specified). PET also allows NEXT X,Y (a multiple NEXT) while the Atari will not.

Variable GOTO, GOSUB and LIST

The Atari allows the use of variables for target lines in a GOTO, GOSUB, or LIST statement as shown with this program:

```
10 HERE=200
20 GOTO HERE
30 PRINT "NOT HERE"
200 PRINT "HERE AT LINE 200"
210 HERE=400  GOTO 20
400 PRINT "HERE AT LINE 400"


PET RESULTS  :?UNDEF'D STATEMENT
                        ERROR IN 20

ATARI RESULTS:HERE AT LINE 200
              HERE AT LINE 400
```

Slight modifications will show that GOSUB responds likewise. Then I tried:

```
LIST HERE
```

The Atari listed line 400, since after running the program HERE contains 400. Not bad at all. This capability should prove to be a lot of fun.

The Atari clears out any program presently in memory when it encounters the command CLOAD, while the PET does not.

Video Screen Line Lengths

Line lengths are similar on both computers. The PET has 25 lines of 40 characters per line and allows two lines to be used consecutively for an 80 character logical line.

The Atari has 24 lines with a default of 38 characters per line and allows three lines as a logical line. However, it also allows the user to change the line length. With two POKE commands you can change your line length to 40, or 36, or 38, for example. Thus, the logical line would be 120, 108 and 99, respectively, with 114 as default logical line length.

The PET requires the cursor to be on one of the characters in the logical line when RETURN is hit to take effect. The Atari allowed me to hit return with the cursor on the fourth line accepting the previous three (one logical line), but only if the cursor was on the fourth line due to typing past the end of the third line.

Atari allows the line lengths to vary within a program. For example, I tried this program:

```
10 PRINT "ONE"
20 POKE 82,5:REM SET LEFT MARGIN TO 5
30 PRINT "TWO"
40 PRINT "THREE"
```

The results when RUN were:

```
ONE
TWO
      THREE


READY
■
```

Note that the change in left margin did not occur when the POKE was issued, but rather after the next carriage return was issued following printing TWO.

Cursor: In case you were wondering, a cursor is the marker that indicates your present location on the screen. The PET cursor is a blinking white box. If a character is beneath the cursor it alternates reverse field on and off. The Atari cursor also is a white box, although it does not blink. Any character beneath it is reverse field.

Loading and Saving Programs

Load: The PET loads a program from tape in this manner: You type in LOAD"PROGRAM NAME" (or simply LOAD) and hit RETURN. The PET then checks if the PLAY (or REWIND or FASTFORWARD) button is depressed. If not, it prompts you with PRESS PLAY ON TAPE #1. Once PLAY is pressed, it replies OK and SEARCHING. When it finds a program it prints FOUND FILENAME and checks if it is the one you asked for. If not, it continues searching. If it is correct, it prints LOADING and loads the program. When finished, the Basic pointers are adjusted and it prints READY.

The Atari appears to load a program like this: You type in CLOAD and hit RETURN (no file name is allowed). It beeps at you once and you then press play on your tape recorder and hit RETURN once again. It will load the program and print READY when done.

As you can see, the procedures are very different. Another difference is that the Atari clears out any program presently in memory when it encounters the command CLOAD, while the PET does not. For example: You type CLOAD (or LOAD) and hit RETURN. The Atari beeps. The PET prints PRESS PLAY ON TAPE #1. Now you decide to use the program presently in the computer instead, so hit BREAK(on the Atari) or STOP (on the PET) and try LIST. The PET will still list your old program. The Atari shows no program in memory.

Save a Program: PET saves a program in this manner: Type SAVE "PROGRAM" (or simply SAVE) and hit RETURN. The PET replies PRESS PLAY & RECORD ON TAPE #1 (unless the buttons are already down). Press them and it says OK WRITING PROGRAM. When done it says READY.

The PET allows you to VERIFY that a tape just SAVED is correct, while Atari apparently doesn't have this feature.

The Atari saves a program like this: Type CSAVE (no file name is allowed) and hit RETURN. It beeps twice. You must then press record and play on the tape unit, hit RETURN again and the Atari saves the program. It replies READY when done.

The procedural differences are again apparent here. Also note that the PET allows you to VERIFY that a tape just SAVED is correct, while Atari apparently doesn't have this feature.

With the usual SAVE or CSAVE the program is saved in its memory efficient token form. You can save it in its ASCII or untokenized form like this:

```
PET: type OPEN 1,1,1 : CMD1 : LIST
     then PRINT#1 : CLOSE 1

ATARI: type LIST"C1:"
```

To load programs saved this way into the PET, some trickery is involved. With the Atari it is rather simple using the Basic command ENTER. When through loading it is ready to RUN.

The difference in the two methods is that the program is normally saved in tokenized form (the first method). The second method (LIST) saves the program in its untokenized form.

Input

For the Atari, using the INPUT command is limited only to the amount that fits into one logical line (three screen lines). Let's look closer at this using this test program:

```
10 INPUT A
20 PRINT A
```

When it is RUN a question mark is printed as your prompt. I just typed in

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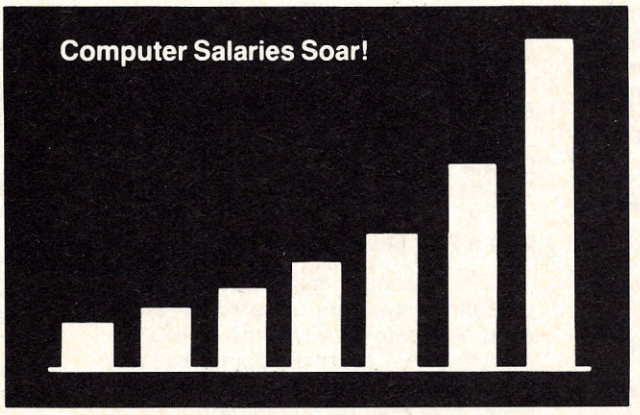

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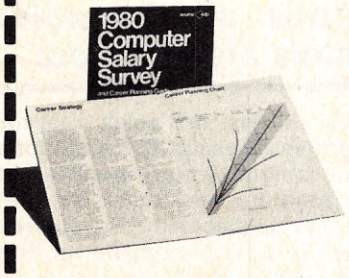

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Atari, cont'd...

1234567890123456... etc. past the end of the logical line. The PET and Atari treated this differently. Suppose we type a 7 at the end of the logical line and continue on the next line with 89 and then hit RETURN?

The PET prints 89 as the answer, ignoring the first logical line typed. The Atari prints 1234567890123456...567 as the answer. It accepts the first full logical line and ignores everything after that. This could use further testing, and I welcome comments.

Both allow string manipulation but in different ways.

There is another significant difference with the INPUT statement. The PET allows a "prompt" to be included such as:

```
10 INPUT"ENTER NAME PLEASE";N$
```

The Atari does not allow this. A PRINT statement must first be used such as:

```
10 PRINT"ENTER NAME PLEASE";
20 INPUT N$
```

Atari also does not allow you to INPUT into an array (PET does). You must first input into a dummy variable and then set the array element equal to that variable.

Restore

Both computers use the command RESTORE to allow DATA statements to be read again. Both start reading DATA from the first DATA line after a RESTORE. However, the Atari also lets you restore DATA lines beginning at whatever line you wish. For example:

```
10 DATA 10
20 DATA 20
30 DATA 30
40 READ A, B, C
50 PRINT A, B, C
70 GOTO 40
```

The above program produces an error on both computers since it can only read DATA once, and runs out of DATA when we GOTO 40. However, if we add:

```
60 RESTORE
```

Both computers continue printing:

```
10      20      30
10      20      30
10      20      30
etc.
```

The Atari will also allow you to RESTORE DATA beginning with any line, say line 30 in our example. I tried this:

```
10 DATA 10
20 DATA 20
30 DATA 30
40 READ A, B, C
50 PRINT A, B, C
60 RESTORE 30
70 READ A
80 PRINT A
```

The Atari gave this result:

```
10      20      30

30

READY
```

Notice that after RESTORED to line 30, it did not start with DATA in lines 10 or 20, but began at 30, as we instructed it. The PET does not have this feature.

And a Few More Differences

This is only supposed to be a partial comparison, not a book (and I need my time to write the books on Atari and PET that I am doing) so I will quickly mention a few more differences that may be significant.

Strings: One major difference is how each Basic treats strings. Both allow string manipulation, but in different ways, and Atari is a bit more complicated in my opinion. PET dynamically allocates strings as they are needed, and their lengths may vary throughout a program. However, Atari requires that all strings used be DIMed first, defining the maximum number of characters to be allowed in the string. Atari also doesn't allow string arrays, while PET does.

Adding strings together (concatenating) is very easy with a standard Microsoft Basic. Thus, the PET would allow you to add two strings together to get a third in this manner:

```
100 A$="TESTING"
110 B$="1234"
120 C$=A$+B$
130 PRINT C$
```

The result is: TESTING1234

To do the same thing on the Atari requires some tricky maneuvering as follows:

```
10 DIM C$(20), B$(20), A$(20)
100 A$="TESTING"
110 B$="1234"
120 C$=A$
130 C$(LEN(C$)+1)=B$
140 PRINT C$
```

The result is: TESTING1234

Most general Basic program listings will use the A$+B$ method.

Error Messages: If either computer hits an error, it will let you know (unless it is locked out — then the PET must be turned off and back on, while the Atari lets you hit SYSTEM RESET to get back, program intact). The PET prints a message such as BAD SUBSCRIPT ERROR, while the Atari only prints an error number. You then must look up that error number in the manual to see what went wrong.

Error Trapping: The Atari allows you to TRAP errors as they occur during a RUN of your program if you wish. For example:

```
100 TRAP 200
```

If an error occurs, control will be transferred to line 200. This gives you a chance to plan ahead with error handling routines. Different traps can be set throughout the program. PET doesn't have anything like this.

Conclusion

Both seem to be excellently designed, the PET for its all-in-one packaging, and the Atari for its modular approach including ROM, RAM, SOFTWARE and LANGUAGE cartridge modules. Both units are good looking and designed for ease of use. For example, the Atari SYSTEM RESET key is protected from accidental depression by thin plastic walls on two sides. I like that! The Atari has a convenient POWER ON indicator light. Since your TV screen can be ruined by leaving the same image on it for too long, the Atari keeps track of how long the unit has not been accessed. If several minutes go by it begins a color change routine and every few seconds all the color registers are changed.

Both computers seem to be very flexible and expandable units, and I am very happy with both. If high resolution and color graphics are important to you, then the Atari should catch your eye. It also has sound control built into its Basic. However, one voice sound capability is easily added to the PET with only two wires and an amplifier/speaker.

If several minutes go by it begins a color change routine and every few seconds all the color registers are changed.

Over the last two years a lot has been written about the PET, and a lot of software is commercially available for it. The Atari is a newcomer, but I am sure it also will become quite popular. Software is already popping up from second sources and user groups are forming. I hope this comparison was useful and I welcome comments. Remember that this article focused on the Atari, and many excellent advantages of the PET are not mentioned. It is hoped that seeing the Atari compared to a popular computer already well known will help your understanding of the new kid in town. □

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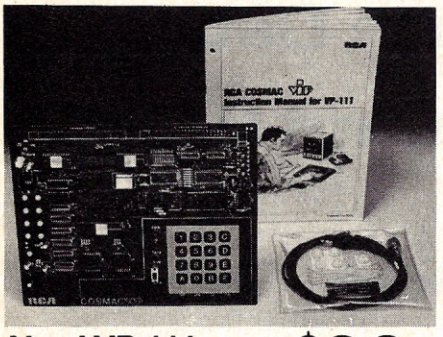

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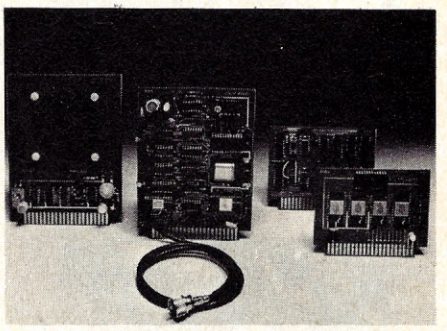

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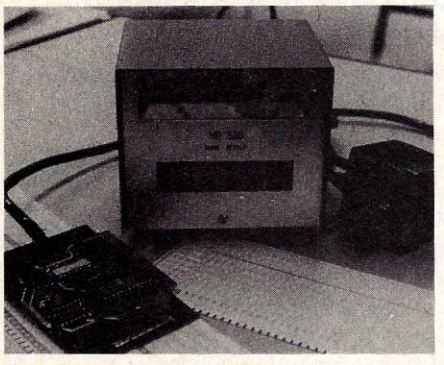

Shown are the interface, card reader and AC/DC adapter.

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1	2	3	4	5	6	7
&	&	&	&	&	&	&
—	—	—	—	—	—	—
0	0	0	0	0	0	0
1	1	1	1	A J / 1	A J / 1	A J / 1
2	2	2	2	B K S 2 : [ ] /	B K S 2 : [ ] /	B K S 2 : [ ] /
3	3	3	3	C L T 3 # . $ '	C L T 3 # . $ '	C L T 3 # . $ '
4	4	4	4	D M U 4 @ < * %	D M U 4 @ < * %	D M U 4 @ < * %
5	5	5	5	E N V 5 ↓ ( ) ←	E N V 5 ↓ ( ) ←	E N V 5 ↓ ( ) ←
6	6	6	6	F O W 6 = + ; >	F O W 6 = + ; >	F O W 6 = + ; >
7	7	7	7	G P X 7 " I ↑ ?	G P X 7 " I ↑ ?	G P X 7 " I ↑ ?
8	8	8	8	H Q Y 8 ■ ■	H Q Y 8 ■ ■	H Q Y 8 ■ ■
9	9	9	9	I R Z 9	I R Z 9	I R Z 9

Figure 1. Sample of the first 7 columns of a mark sense programming card. The cards have a total of 40 columns.

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Chatsworth, cont'd...

ditional advantage to educators is using the card reader to grade multiple choice tests. A special test scoring card is used which allows for 100 questions, each with 5 possible answers. Students shade in the appropriate answer on the card as they take the test. The cards are then fed through the reader and are graded by using a test scoring program which is furnished by Chatsworth Data on request, at time of purchase.

The Chatsworth Card Reader is compact in size, 4.6″(width) x 4.3″ (height)x4.5″ depth, and weighs only 4 pounds. It is composed of the main reader housing, with motor to drive the reader, an AC/DC converter and an interface board and all are included in the purchase of the reader.

It was a simple task to get the reader up and running with my Apple Plus II. The interface board was plugged into slot 4 of the Apple and the other end of the interface cord was attached to the reader. The AC/DC adapter was plugged into an electrical outlet and the reader was ready for its first performance. The computer was ready to accept information from the card reader after the "IN#4" command was typed and the return key hit. Returning to keyboard use was accomplished by marking a card with the "IN#0" command and feeding it through the reader. The "IN#4" and "IN#0" commands may also be used within programs to enter data from the reader.

Marking Programming Cards

Figure 1 shows a portion of a programming card, drawn to an enlarged size. When marking a program, columns 1-4 are used for the line number. Columns 5-40 are marked for the Basic statement. The cards are marked using the standard Hollerith Code and a #2 pencil. Figure 2 shows the card symbols, symbol location within the boxes and the appropriate marking for the symbols. The following are a few examples of the correct markings required to enter data by card: To enter 0-9 numbers simply shade in the appropriate box of the number. Letters A-I are marked by shading the (&) box plus the box containing the letter. Examples are letter C marked by (&3), and F by (&6). Letters J-R are marked by the (-) box and the corresponding letter. Letter K is (- 2) with Q being a (- 8). Letters S-Z are marked in a similar way, shown in Figure 2. The symbols appearing at the bottom center of the boxes, below the numbers, are marked by a combination of (8) and the appropriate box. An equal sign, for example, is a (6 8) mark combination. The symbols to the right of the boxes are marked by combinations of one of the following (& - 0) plus (8) and the appropriate box containing the desired symbol. See Figure 2 for the exact combinations.

SYMBOL LOCATION	SYMBOLS	MARKING
Center of Box	1 2 3 4 5 6 7 8 9 0	appropriate box
Top Left of Box	A B C D E F G H I	appropriate box plus (&)
Center Left of Box	J K L M N O P Q R	appropriate box plus (-)
Bottom Left of Box	/ S T U V W X Y Z	appropriate box plus (0)
Bottom Center of Box	: # @ = ″	appropriate box plus (8)
Top Right of Box	[. < (+ !	appropriate box plus (&) plus (8)
Center Right of Box	] $ *) ; ↑	appropriate box plus (-) plus (8)
Bottom Right of Box	/ ' % ← > ?	appropriate box plus (0) plus (8)
Carriage Return & 5 8 9		
Line feed 0 5 9		

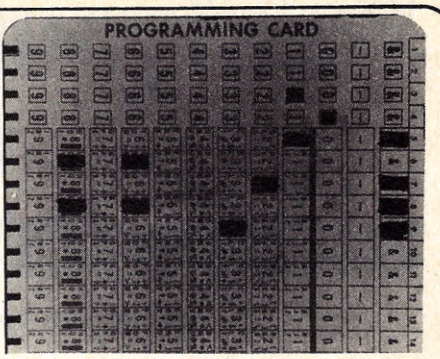
Figure 2. Other ASC II characters can also be marked on the cards. An entire list with the correct marking codes are furnished with the reader instructions.

Entering Data

Entering a program is a simple procedure. Using the "IN#4" command the computer looks for information from the reader. Input all the cards, with the last being the "IN#0" command to return to the keyboard, and the program is ready to run. If it is desired to run the program by using the reader, then do not use the "IN#0" card and enter instead the "RUN" statement.

Several methods are available for entering variables into an existing program. I have found the easiest method to input a long list of variables is through the use of data statements. Mark the variables on a card, always using the same program line, so as not to accidentally destroy another line of the program. Enter the data statement before running the program. This procedure can easily be adapted for programs you already have by changing "INPUT" statements to "READ" statements through the program.

A second method of using the reader to input variables is to use the the "IN#4" and "IN#0" commands



Shown is the correct marking for the statement 10 A = B + C.

within the program. The variables are entered through the reader when requested. If the program statement "INPUT A.B.C.D.E" is used, then an equal number of variables may be entered on a single card. However, each variable must be separated by a comma.

A third method to input variables is the use of a FOR-NEXT loop, again with the "IN#4" and "IN#0" commands within the program. See Figure 3 for a sample program using the FOR-NEXT loop. Use of the loop, however, requires that only one variable be marked on each card. This could lead to using a large number of cards.

```
400 IN#4
410 FOR I= 1 TO 10
420 PRINT "INPUT CARD"
430 INPUT A(I)
440 NEXT I
450 IN#0
```

Figure 3.

The FOR-NEXT loop above can be used to input variables into a program. The IN#4 command allows the computer to accept data from the reader and line 450 returns control to the keyboard.

Cost

Chatsworth Data is presently advertising the card reader, AC/DC converter and interface at $750. The cost of programming cards is $15/1000.

Thus far I have had no problems with the reader. It is a fantastic piece of computer equipment. Obviously I still use the keyboard to enter programs, but the card reader has made it possible for one microcomputer to handle programs from a full classroom of students. So, unless your school system can afford a dozen microcomputers, or you don't mind having 25 students waiting in line, you may want to join me as a rejoicing owner of a Chatsworth Data MR-500 Mark Sense Card Reader. □

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CIRCLE 121 ON READER SERVICE CARD

Reading Comprehension For The SOL-20

Randy Heuer

When writing a software package for use by those in the educational community, the program author is faced with three very real problems. First, the program must appeal in some way to the student. Without this, the students may become bored and spend more of his/her time trying to defeat the purpose of the software rather than devoting this time to learning. Second, most educators who must use the programs are rarely familiar with computers and are often quite afraid of them. Thus the software must be written so these fears can be overcome and user mistakes will be forgiven. Finally, and perhaps most difficult, the programmer must try to solve these two problems within the limitations of whatever computer system is chosen (microcomputer or otherwise). This problem may severely limit the extent to which the first two problems can be solved.

These were the major obstacles I foresaw when I undertook a reading comprehension project for a school district client of Creative Computing Software. The objective was to develop a student's reading comprehension through the use of a computer (in this case a SOL-20 with 32K of memory). Cassette based files were to be used so the teachers could create their own data tapes and the students could use them interchangably.

Basic Concepts

The following approach was taken toward developing basic reading comprehension skills! The student is presented with a brief short story which may take as long as he wants to read. After the student has finished reading the story, the program presents the student with several multiple choice questions about the story. At the teacher's option, the student may be given a limited amount of time to answer the questions.

I decided that the package would consist of three BASIC programs. Two of the programs would be used by the instructors to create the data tapes. The first, entitled TEXT, would be used to create, edit and copy the short story files. The second program, called QUES, would be used to create, edit and copy the question and answer file. The final program, QUIZ, would use the data tapes created with the first two programs to present the student with the exercise. (See Figure 1 to see how the three programs interact.)

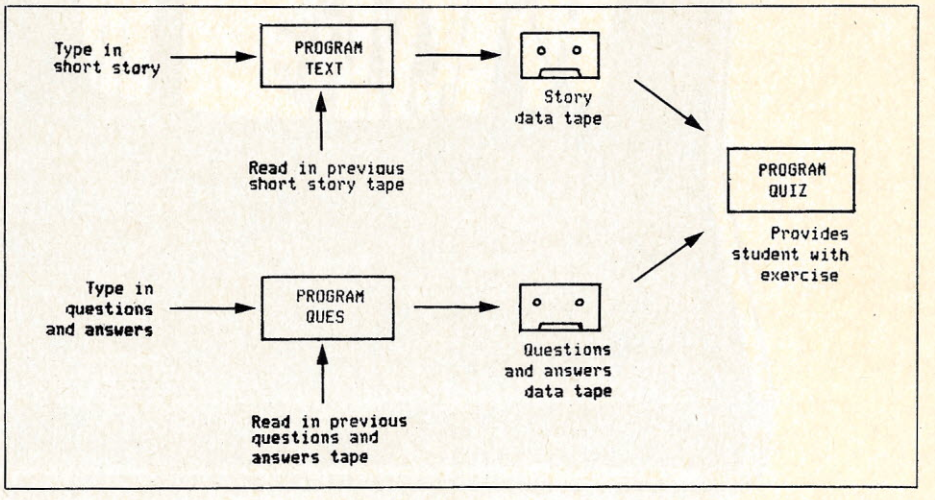

Figure 1

```
    The long, hot summer was coming to an end.  August
was a scorcher.  There was no rain for almost three
weeks.  The heat was unbearable.  The grass had
turned from a bright green color to a light shade
of tan.
     The circus was swinging around toward home now,
working back toward a good place to cross the river
into New Jersey.  With the heat, the river was a
lot shallower than it usually was at this time of the
year.  The circus caravan would have no trouble
crossing the river.
     The wind blew across the travelers like a blast
------------------------------------------------
Are you ready to go on?
```

Example from QUIZ program - the first "page" of a story as presented to the student. To turn the page, the student presses the "Y" key.

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NEW! Micro-SEED DBMS If you are developing applications software in-house or bundling hardware and software for resale, a database manager could be the software tool you've been looking for. Micro-SEED is the first CODASYL compatible database management system to run with CP/M; and Microsoft's FORTRAN-80 has been implemented as the host language. When an application becomes limited by traditional floppy disk file handling, but remains overpowered by the cost and maintenance of a minicomputer, the solution is Micro-SEED. $900.

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BASIC COMPILER	●	●	□	●	
FORTRAN-80 COMPILER	●	●	□	■	●
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We set the standard.

```
--------------------------------------------------
When was the circus heading toward home?


1. In the spring
2. At the beginning of the summer
3. Near the end of the summer
4. In the winter
--------------------------------------------------
TIME REMAINING   2 MINUTES     0 SECONDS    YOUR ANSWER?
```

Example from QUIZ program - typical question as presented to the student.

```
    The long, hot summer was coming to an end.  August
was a scorcher.  There was no rain for almost three
weeks.  The heat was unbearable.  The grass had
turned from a bright green color to a light shade
of tan.
    The circus was swinging around toward home now,
working back toward a good place to cross the river
into New Jersey.  With the heat, the river was a
lot shallower than it usually was at this time of the
year.  The circus caravan would have no trouble

Do you want to continue Displaying?
```

TEXT program - using the display mode, the first ten lines of the story are displayed. If the user asks to insert a line after line 3 the computer will display...

How The Software Works

Designing software to accomplish the tasks outlined in Figure 1 is not particularly difficult, however, remember that these programs are to be used by people unfamiliar with computers. Thus the programs must be forgiving to incorrect input and self-instructing. These are the features that separate poor software from people-oriented software.

As outlined earlier, the extent to which these tasks can be accomplished is often dependent on the computer system used. For this project, a 32K SOL-20 was employed. Processor Technology's Extended Cassette BASIC requires approximately 15K of this memory. String variables for the data files and editing features occupy another 8K, leaving about 9K to store code and other variables.

With such stringent memory limitations, it was decided that extensive instructions would not be included in the programs. Instead the bulk of this free memory would be devoted to making the programs as user oriented (or "idiot-proof") as possible. In this way, users could press almost any key on the keyboard during prompts and the program would forgive any incorrect input. In addition, if the user wishes to make major changes to the file, the program will visually verify the changes requested and allow the user to change his mind. This feature keeps both experienced and inexperienced users from making silly mistakes and damaging their work.

The first program, TEXT, is used by the teacher to create, edit, and copy the short story data tapes. The short stories may be entered from the keyboard or loaded from an existing short story tape. When stories are entered from the keyboard, they are typed in just as they would be on a normal typewriter. Any mix of upper and lower case letters or numbers is permitted.

After the story is entered, the program proceeds to the editor routine. This part of the program allows the teacher to modify the story. The three edit operations allowed are DELETE, INSERT and CHANGE.

Regardless of which edit operation the teacher wishes to make, the first step is to display a group of ten lines. The story can be stepped through ten lines at a time until the teacher finds the line he wants to edit. At this point, the program will request the teacher to specify the type of edit operation desired (INSERT, DELETE or CHANGE), and ask which of the displayed lines is to be altered. After this information is entered, the program removes the line to be deleted or changed from the screen, or for the insert mode, placing a blank line where the teacher requested to insert a new line. The program then asks,

IS THIS THE LINE?

If the teacher has mistakenly chosen the wrong edit operation or the wrong line, the program now offers the user a way out without modifying any of the story. This is done by responding 'NO' to this inquiry. A 'YES' response will allow the desired modification to be made.

After all desired editing is accomplished, the program branches to the routine for saving the short story on cassette tape. This routine allows the user to make as many copies of the short story as needed.

The second program, QUES, is used by the teacher to create the question and answer data tape. Similar to the TEXT program, the questions and answers can be entered from the keyboard or from an existing data tape. Questions are of the multiple choice variety where each may have up to four possible answers. True-false questions are also acceptable.

This program also features an editor routine which allows the teacher to change either the questions, any of the answers or the number of the correct answers. Similar to the TEXT program, any part of the questions or answers the user requests to change, is displayed prior to the changes actually being made in memory. This feature helps prevent the user from accidently making undesirable changes.

The teacher also specifies at this time whether to place a time limitation for the student to answer the questions. If a time limit is chosen, the student will be required to answer

Comprehension, cont'd...

all the questions within the specified amount of time. Otherwise the student will have an indefinite amount of time to answer the questions.

After the teacher has completed the short story data tape and the question and answer data tape using the TEXT and QUES programs, the student can be presented the exercise using the QUIZ program. After reading both data files, the program first presents the student with the short story. The story is displayed twelve lines at a time, much as if the student was reading a book. The student "turns the page" by pressing the 'Y' key. Unlike a book, the student cannot turn back the page to review what he has read. Thus the student is required to try to comprehend what he is reading.

After the student has completed reading the story, he is presented with the multiple choice questions. The student is informed before he starts if there is a time limit to answer. Each question is displayed on the screen with its four possible answers and the time remaining. To answer the question, the student presses the key of the answer he thinks is correct. The computer will inform the student if he has chosen the correct answer.

If the student chooses the correct answer, the computer will proceed to the next question, otherwise the student must keep attempting the same question until he selects the correct answer. When all of the questions are answered, or if the student takes too much time, the program provides a numerical and descriptive evaluation of the student's results.

Did I Accomplish What I Wanted?

Now that the software is completed, did I solve the three problems I outlined at the beginning of the project? Let's look at them one at a time.

First, is the program enjoyable to use by the student? To an extent, I suppose this depends upon the individual using the program. I haven't attempted to make the subject of reading comprehension a game. The purpose of the program is a reading comprehension exercise. Some students will not find any exercise fun, no matter how it is done, but I believe most students will find the program challenging and will try to do the best they can. I'll have to wait for reports from the educational community to see if this is true.

The second problem was to make the programs easy to use, particularly for the teachers. In this area I feel the programs accomplish all that can be expected. Each of the programs has been designed to accept any user input and provide help when receiving incorrect input. Major modifications to the user's work are first verified by features that display the changes the user requested before permanent changes are made. This helps eliminate making undesired changes accidentally.

The final problem to overcome was to solve the previous two problems within the limitations of the chosen computer system. Obviously, this has been accomplished. Other features such as disk based files and more memory for larger data files would be desirable, but were not included due to the limitations imposed. However, within these limitations this seems to be an effective method of strengthening reading comprehension skills.

A Reading Comprehension Package for the SOL-20 is available from Creative Computing Software. CS-8201 is a five cassette package designed for developing reading comprehension skills.

The package uses cassette based files to present a short story and accompanying multiple choice questions on the screen. Two of the programs are used for creating, copying and editing these files. Two other programs use these files to present the story and the quiz. The final tape contains a sample short story and questions. A 32-page instruction manual is included in the package.

This package requires a SOL-20 with a minimum of 32K of memory and Processor Technology's Extended Cassette BASIC. The retail price of this package is $50.00. □

```
     The long, hot summer was coming to an end.  August
was a scorcher.  There was no rain for almost three
weeks.  The heat was unbearable.  The grass had
?
turned from a bright green color to a light shade
of tan.
     The circus was swinging around toward home now,
working back toward a good place to cross the river
into New Jersey.  With the heat, the river was a
lot shallower than it usually was at this time of the
year.  The circus caravan would have no trouble

HERE?
```

...A blank line after the third line and an opportunity to back out of the insert mode. If the user responds "No" to the Here? Prompt, no changes will be made to the story. A "Yes" response will allow the desired changes to be made.

```
ANSWER # 1
   In the spring
ANSWER # 2
   At the beginning of the summer
ANSWER # 3
   Near the end of the summer
ANSWER # 4
   In the winter
Do you want to make any changes?
```

Example from QUES program - editing routine allows the user to view the present answers before making any changes.

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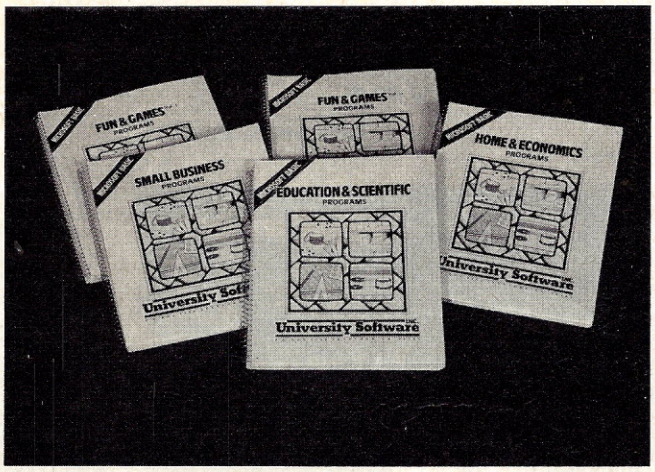

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Ancient Literature With Modern Computers

An Interview with Dia Philippides

By Mary Nicolopoulos

Dia Philippides, a doctoral student at Princeton University, was among the classical scholars attending the computer colloquium at the 1976 annual meeting of the American Philological Association held in New York December 28-30. I asked Miss Philippides to explain the link up between computers and the classics.

Q. How do computers help classical scholars in their work?

A. Computers can cut years off the time it would take to complete certain projects. Once a text is put on computer tape, computer programs can be applied to the text and time-saving miracles are performed. The computer can be programmed to analyze metric verse as one would analyze music for its structure and form. This is the type of work I am involved with—I am working on a project which will provide a better understanding of the meter used by the Greek tragedians in their spoken dialogue. The computer can also verify the authorship of a text through stylistic analysis by checking for a variety of factors such as the position of the verb in the line or the type and frequency of particles the author uses. The compilation of concordances, indices and dictionaries can be tremendously facilitated by the use of programs which instruct the computer to scan a text for a particular word and print it out along with the sentence or line in which it occurs.

Q. Are classical texts readily available on computer tape now?

A. Yes. The Thesaurus Linguae Graecae Project, headed by Ted Brunner of the University of California at Irving, has undertaken to put all of Greek literature on computer tape. So far they have computerized 18.5 million words of text and their goal is 90 million words. The availability of the computerized texts saves years of time for a scholar who would otherwise have to prepare and proofread his own tapes before beginning his analysis. If I were to sit down now and keypunch the 33 tragedies which my work involves, I would be here three years from now still punching. At present these tapes must be purchased rather than rented or borrowed and they are costly for an individual's budget. Eventually I foresee that certain universities will have the complete collection of Greek literature available in tape libraries.

Q. How long have classicists been using computers in their work?

A. I would say that the field is approximately ten years old. A. Q. Morton is one of the first in the field. With the help of monks in Scotland as volunteer keypunchers, he computerized Homer to facilitate his research. Since then other scholars have computerized various other works. Stephen Waite at Dartmouth College created a centralized repository for the American Philological Association to collect whichever Greek and Latin texts have been computerized and make them available to all interested scholars.

Q. Where is the main work being done in this field?

A. One of the leaders in this field in the United States is David Packard who is at the University of North Carolina at Chapel Hill. I have already mentioned Ted Brunner at Irving and Stephen Waite at Dartmouth. Now there are a couple of us in the New York area who are starting and a few in eastern Canada.

In Liege, Belgium, the Laboratory for the Statistical Analysis of Ancient Languages carries out much work of this nature. Several distinguished scholars are permanently in residence there while others take part on a visiting basis. The Laboratory has been publishing a quarterly periodical for ten years. The collaboration found at Liege is something which we do not have yet in the United States. The great distances between Chapel Hill, Irving, Dartmouth, etc., have caused efforts up to now to be largely individual ones.

Continued on page 45

Miss Dia Philippides with her computers.

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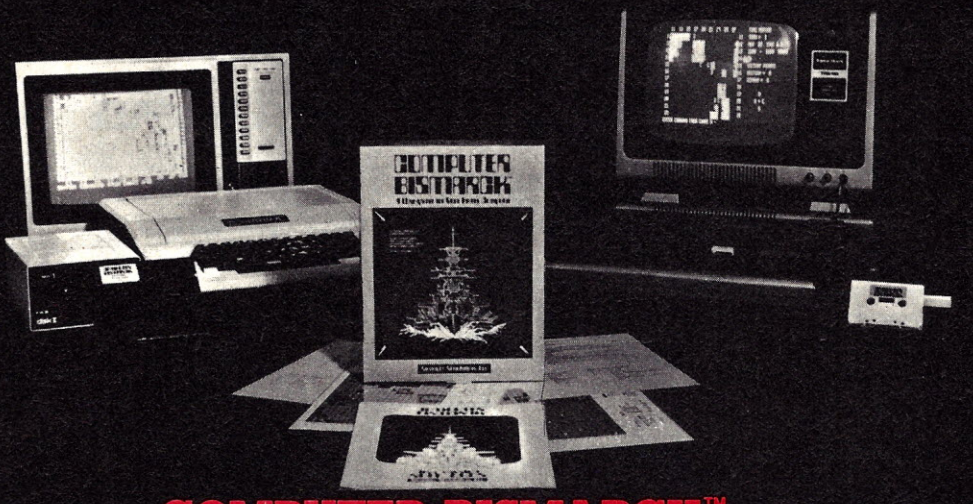

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☐ **PASCAL/M*** — Compiler generates P code from ex- Ⓘ tended language, implementation of standard PASCAL. Supports overlay structure through additional procedure calls and the SEGMENT procedure type. Provides convenient string handling capability with the added variable type STRING. Untyped files allow memory image I/O. Requires 56K CP/M .... **$350/$30**

☐ **PASCAL/Z** — Z80 native code PASCAL compiler. Pro- Ⓘ duces optimized, ROMable re-entrant code. All interfacing to CP/M is through the support library. The package includes compiler, companion macro-assembler and source for the library. Requires 56K and Z80 CPU.
Version 2 includes all of Jensen/Wirth except variant records ..... **$275/$25**
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☐ **PASCAL/MT** — Subset of standard PASCAL. Gener- Ⓜ ates ROMable 8080 machine code. Symbolic debug- Ⓧ ger included. Supports interrupt procedures, CP/M file I/O and assembly language interface. Real variables can be BCD, software floating point, or AMD 9511 hardware floating point. Version 3 includes Sets, Enumeration and Record data types. Manual explains BASIC to PASCAL conversion. Source for the run time package requires MAC (See under Digital Research). Requires 32K ..... **$250/$30**

New Version / New Features

STRUCTURED SYSTEMS GROUP

☐ **GENERAL LEDGER** — Interactive and flexible system †† providing proof and report outputs. Customization of COA created interactively. Multiple branch accounting centers. Extensive checking performed at data entry for proof, COA correctness, etc. Journal entries may be batched prior to posting. Closing procedure automatically backs up input files. Now includes Statement of Changes in Financial Position. Requires CBASIC-2 ..... **$1250/$25**

☐ **ACCOUNTS RECEIVABLE** — Open item system with †† output for internal aged reports and customer-oriented statement and billing purposes. On-Line Enquiry permits information for Customer Service and Credit departments. Interface to General Ledger provided if both systems used. Requires CBASIC-2. ..... **$1250/$25**

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☐ **PAYROLL** — Flexible payroll system handles weekly, †† bi-weekly, semi-monthly and monthly payroll periods. Tips, bonuses, re-imbursements, advances, sick pay, vacation pay, and compensation time are all part of the payroll records. Prints government required periodic reports and will post to multiple SSG General Ledger accounts. Requires CBASIC-2 and 54K of memory ..... **$1250/$25**

Software with Manual / Manual Alone

☐ **INVENTORY CONTROL SYSTEM** — Performs control †† functions of adding and depleting stock items, adding new items and deleting old items. Tracks quantity of items on hand, on order and back-ordered. Optional hard copy audit trail is available. Reports include Master Item List, Stock Activity, Stock Valuation and Re-order List. Requires CBASIC-2 **$1250/$25**

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PEACHTREE SOFTWARE

☐ **GENERAL LEDGER** — Records details of all financial Ⓛ transactions. Generates a balance sheet and an in- †† come statement. Flexible and adaptable design for both small businesses and firms performing client writeup services. Produces reports as follows: Trial Balance, Transaction Registers, Balance Sheet, Prior Year Comparative Balance Sheet, Income Statement, Prior Year Comparative Income Statement and Department Income Statements. Interactive with other PEACHTREE accounting packages. Supplied in source code for Microsoft BASIC ..... **$990/$30**

New Features

☐ **ACCOUNTS PAYABLE** — Tracks current and aged Ⓛ payables and incorporates a check writing feature. †† Maintains a complete vendor file with information on purchase orders and discount terms as well as active account status. Produces reports as follows: Open Voucher Report, Accounts Payable Ageing Report and Cash Requirements. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC ..... **$990/$30**

☐ **ACCOUNTS RECEIVABLE** — Generates invoice regis- Ⓛ ter and complete monthly statements. Tracks current †† and aged receivables. Maintains customer file including credit information and account status. The current status of any customer account is instantly available. Produces reports as follows: Aged Accounts Receivable, Invoice Register, Payment and Adjustment Register and Customer Account Status Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC .. **$990/$30**

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☐ **INVENTORY** — Maintains detailed information on Ⓛ each inventory item including part number, descrip- †† tion, unit of measure, vendor and reorder data, item activity and complete information on current item costs, pricing and sales. Produces reports as follows: Physical Inventory Worksheet, Inventory Price List, Departmental Summary Report, Inventory Status Report, The Reorder Report and the Period-to-Date and Year-to-Date reports. Supplied in source code for Microsoft BASIC ..... **$1,190/$30**

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☐ **GENERAL LEDGER** — An on-line system; no batch- Ⓛ ing is required. Entries to other GRAHAM-DORIAN Ⓜ accounting packages are automatically posted. User †† establishes customized C.O.A., provides transaction register, record of journal entries, trial balances and monthly closings. Keeps 14 month history and provides comparison of current year with previous year. Requires CBASIC-2. Supplied in source ... **$995/$35**

New Features

☐ **ACCOUNTS PAYABLE** — Maintains vendor list and Ⓛ check register. Performs cash flow analysis. Flexible Ⓜ — writes checks to specific vendor for certain in- †† voices or can make partial payments. Automatically posts to GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source ..... **$995/$35**

☐ **ACCOUNTS RECEIVABLE** — Creates trial balance re- Ⓛ ports, prepares statements, ages accounts and rec- Ⓜ ords invoices. Provides complete information describ- †† ing customer payment activity. Receipts can be posted to different ledger accounts. Entries automatically update GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source ..... **$995/$35**

Software with Manual / Manual Alone

☐ **PAYROLL SYSTEM** — Maintains employee master file. Ⓛ Computes payroll withholding for FICA, Federal and Ⓜ State taxes. Prints payroll register, checks, quarterly †† reports and W-2 forms. Can generate ad hoc reports and employee form letters with mail labels. Requires CBASIC-2. Supplied in source ..... **$590/$35**

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☐ **ZDT** — Z80 Monitor Debugger to break and examine Ⓜ registers with standard Zilog/Mostek mnemonic disassembly displays. $35 when ordered with Z80 Development Package ..... **$50/$10**

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New Features

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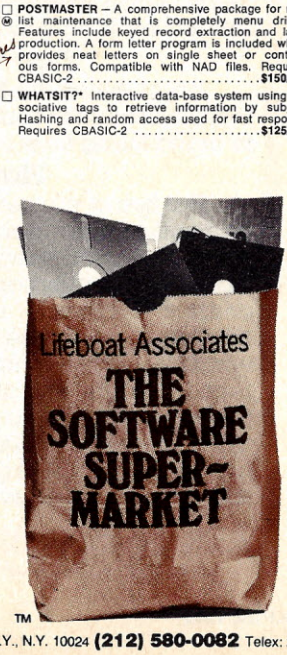

TM

Shopping List No.11

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Q. I want to ask you about your own research but first tell us something about your Greek background since you seem to be one of the very few Greeks in this field.

A. My father is Greek, born in Athens. My mother is American and a classical archaeologist. She has a deep love for Greece, too. I was born in America but we moved to Greece when I was eight. My parents still live in Athens. I had the benefit of Greek schooling in Athens. I attended three different schools all of which were very good. Not knowing any Greek at the outset I managed, with the help of these schools, to graduate with the full credentials of any other Greek high school student. I am proud of the excellent school preparation that I had in Athens. The background that was given to me by my teachers both in math and in classics has enabled me to reach the stage that I am at now. I really would commend the Greek high school program for the preparation it gives one on which to base further training.

Q. How did you become interested in combining computers with classics?

A. I studied computer science as an undergraduate at Radcliffe. I have long been fascinated by the possibility of putting my computer background to work in a new and worthwhile application such as in the studies of Greek. The combination of the two fields requires a solid background in both. Developing the necessary skills took time. I had to study Greek and Latin for six or seven years before I could come back the full circle to using a computer in the study of Greek. Before the computer can be applied to anything one must have an idea of what is permissible and what is feasible in order to come up with valid results.

I attended the 1972 meeting of the Thesaurus Linguae Graecae in Athens. The discussion there of the project to put all of Greek literature on computer tape kindled my interest even further.

When I was faced with the decision of choosing a thesis topic I flew down to Chapel Hill to seek guidance from David Packard. It seemed possible to work with computer in classics but I had to determine which area to work in. From the topics that David Packard suggested, I chose to study the meter of the three Greek tragedians. He had advised me that although many computer-assisted studies had been made of the metrics of Homer, there were few of the spoken dialogue of the Greek tragedians. I have decided to examine more closely the meter used by Euripides since work has already been done on the meter of Aeschylus and Sophocles. I would like to be able to bring out elements which others can use in the future in discussions of Euripides and of tragedy in general.

Q. Can you explain your research in more detail?

A. The goal of the study is to examine closely the differences in style among the three tragedians and to investigate chronological progression and possibly development from the early works of an author to the late works. This may provide additional data to be considered in dating the plays.

To analyze the iambic trimeter used by the Greek tragedians will be quite a bit more complicated than the analyses which have already been done on the hexameter of Homer and of other Greek and Latin works. For the hexameter each line represents one of 32 possible metrical patterns while for the iambic trimeter there are 240 possible patterns. The computer will give me precise data on the structure of the trimeter. It will be able to provide figures on both 'outer' and 'inner' metric. Inner metric takes into consideration the breaks in the line and the words and their actual shapes.

In the total of tragedy, counting only the trimeter and not the choruses, there are 28,000 lines. So to do this by hand might be the work of several years. The most rational method of working it out is the computer. At times the computer will not be able to diagnose a syllable as either long or short since the three ambiguous vowels, alpha, iota and upsilon, can be either long or short. In such cases the computer will print a question mark and with the help of a dictionary I will assign the proper or the statistically more frequent value which also fits an acceptable trimeter pattern. One of the examples I have tried out is the word δάκρυ, "tear", which has two ambiguous syllables. I found that Euripides does not always use the same syllabic length when he employs this word. I would like to determine whether there is something which motivates his use of the word in one length in one context and then in another length in another. This might be indicative of development.

Q. Would you like to try something like this in Greece? Would it appeal to you?

A. It would be very exciting. Greece would be a natural place to work because it is Greek material that is being worked on, it is the Greek heritage —and Greek scholars of necessity would be most interested in it. ■

Reprinted from **GREEK WORLD**

Computerized Testing For Readability

Donald Goodman
Sandra Schwab

We got to the point where we had to coax the paraprofessionals down off the walls about once a week by tossing them Valiums and promising to give them severance pay if they separated from their minds. It was a bad situation, but we really couldn't blame them since we had put them in that situation in the first place. We had all learned to tolerate a little moderate hysteria in our Personalized Achievement Lab, and even permitted screams if they were in good taste.

The problem was Flesch. Not the flesh that leads to corruption of the soul, but the Flesch that leads to a Readability Level. The road to hell may be paved with good intentions, but the road to insanity in a reading lab is paved with syllables: syllables that must be counted by the hundreds.

The road to hell may be paved with good intentions, but the road to insanity in a reading lab is paved with syllables: syllables that must be counted by the hundreds.

For a number of years the instructors in the Muskegon Community College Reading Lab had offered to run readability checks on text books which instructors in academic areas were either currently assigning or were considering adopting. However, we didn't advertise the service very widely because no one really wanted to do it. We were using the Flesch Readability Formula, an excellent

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Paraprofessional Kathy Schrader counting out syllables using her fingers, just prior to uncontrolled outburst.

device for giving a fairly accurate grade level on material which contains at least a hundred running words in each sample. But the formula requires that someone count the words in each sentence and count the syllables in the hundred words. Moreover, one passage is hardly an adequate sample. We felt that at least five or six were needed to accurately measure the readability of each text book. And damned if the instructors were going to do it. We gave it to the paraprofessionals.

Picture them: already harried from a phone that rings incessantly, earnestly trying to count out syllables in six samples of 100 words each from a stack of Nursing texts (how many syllables in vasodilation?) while a sad-eyed student is standing by confessing, "I've turned the knob the wrong way on the EDL machine and jammed the film all in the gears."

No wonder they climbed the walls.

Obviously something had to be done. That something sat cooly in the Math Lab on a confident green table, a placid, silent alternative to the mental storms erupting elsewhere. The para's called it Wanda Wang. The business office calls it a Wang 2200. We call it a computer.

The Training of Wanda

All we had to do was teach Wanda to count sentences and count syllables. She could then give us the average number of words per sentence and the total number of syllables per 100 words. We would plot that information on the Flesch chart, draw a line between the two numbers, and intersect the "grade level" markers telling the readability level. We could probably use it for the Fry Readability formula as well.

It was easy enough to teach Wanda to count words: every space indicates the end of a word.

She could easily note sentences: Periods, question marks, or exclamation marks indicate a sentence. We could have included semi-colons but we didn't.

Paraprofessional Kathy Schrader being told she no longer has to count syllables.

Counting syllables gave us the greatest challenge. After all, there are many not-very-good rules used to teach people how to break words into syllables: Noting certain prefixes and suffixes; watching for vowel-con-

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*Microsoft royalty information for the sale of programs compiled with BASIC Compiler is available from Microsoft.

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Symbolic mathematics is muMATH's power. For the first time, algebra, trigonometry, calculus, integration, differentiation and more can be performed on a system smaller than an IBM 370. And in a fraction of the time you could do them manually.

Yet for all its power, muMATH is simple to use.

To perform a differentiation you could enter: ?DIF (A*X↑3 + SIN(X↑2),X);

In almost no time, the computer would reply with: @2*X*COS(X↑2) + 3*A*X↑2.

Or to add fractions: ?1/3 + 5/6 + 2/5 + 3/7;

The instantaneous answer: 419/210.

Or to perform a more difficult trigonometric expansion you enter: SIN(2*Y)*(4*COS(X)↑3—COS(3*X) + SIN(Y)*(COS(X+Y+#PI) — COS(X—Y));

Just a few seconds later, the computer replies: @4*SIN(Y)*COS(X)*COS(Y).

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If you use math, you'll find countless ways to save time and effort with muMATH. It's a professional tool for engineers and scientists. A learning tool for students at any level from algebra to calculus.

And if you want to expand your capabilities even beyond the standard muMATH, the option is open. muSIMP, the programming language in which muMATH is written, is included in the muMATH package. A superset of the language LISP, muSIMP is designed especially for interactive symbolic mathematics and other artificial intelligence applications.

muMATH and muSIMP were written by The Soft Warehouse, Honolulu, Hawaii. Priced at $74.95, the package includes muMATH, muSIMP and a complete manual. It requires a Model I TRS-80 with 32K and single disk. muMATH for the Apple II Computer will be available later this year.

You can buy muMATH and BASIC Compiler at computer stores across the country that carry Microsoft products. If your local store doesn't have them, call us. 206-454-1315. Or write Microsoft Consumer Products, 10800 Northeast Eighth, Suite 507, Bellevue, WA 98004.

MICROSOFT
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Testing, cont'd...

sonant-vowel groupings, and vowel-consonant - consonant - vowel patterns. Keeping an eye peeled for exceptions signaled by le, ck, ch, th, sh, gh and ph was another technique.

We couldn't teach Wanda to break words into syllables, obviously. She could only count them. But count what?

We were explaining to each other one day why it couldn't be done when the idea flashed upon us. A syllable is a vowel.

There are exceptions, but they are fairly regular and we can control them. There are exceptions to the exceptions, but we had faith that our beloved erratic English would sin as much on one side as another.

We tried many pairing-patterns, and made many arbitrary decisions, some of which had to be changed when we tested - and re-tested - the program.

But now it works. It includes words as well as abbreviations; it works well on long or short words, simple or difficult. A work-study student or paraprofessional can sit down at Wanda, load the program, type out 100 words, and wait for it all to happen.

All we had to do was teach Wanda to count sentences and count syllables.

Rules of the Road

There are six simple rules for the program: (The line numbers refer to the program instructions fed to Wanda)

1. The vowels are AEIOU and Y except at the beginning of a word. (Line Nos. 520 - 610) (Line 525 & 600 & 610)

Each individual vowel is a syllable except these combinations are one syllable:

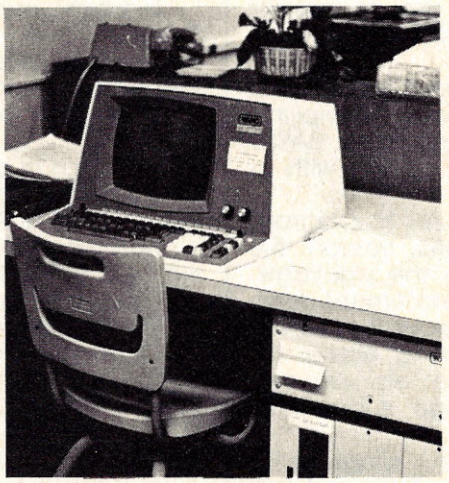
AA	EA	IA	OI	UA
AE	EE	IE	OO	UE
AI	EU	II	OU	UI
AU	EY	IY	OY	UU
AY		ION		UY

(Lines 520 - 610)

This means, by default, that the following combinations count as two syllables:

OE	AO
OA	EO
IO	IU
EI	UO

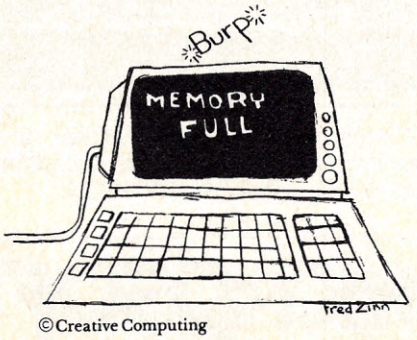
3. When E is found at the end of a word it is not a syllable except when it follows L or when it is the only vowel. (Lines 575 - 578) (Line 579)
4. ED is not a syllable unless it is the only syllable possible (No other counted vowel appears in the word) (Lines 580 - 589)



"That something sat cooly in the Math Lab on a confident green table."

5. ES, by default, is a syllable.
6. Every word has a syllable (This gives THE, as well as TV, PBB, 1979 and similar abbreviations and number clusters one syllable) (Lines 500-517)

In addition we have the following typing directions:
Type as Follows:



ONLY type to the end of the viewing screen (width of 64 characters). The cursor will automatically jump to the next line if you type in the 64 position. You must use the backspace key to erase any characters that appear on the screen's next line. Press the return (exec) key - the cursor will disappear for a few seconds (it's counting the number of words you have entered); when it reappears a question mark will appear on the screen. Continue typing your information and repeat until the computer tells you that you have entered at least 100 words.

When typing look for the following:

1. commas - DO NOT enter any commas that appear in your text.
2. .!? Must be entered to signify the end of sentence. DO NOT use the period except at the end of the sentence. All other punctuation can be inserted or omitted at the typist's discretion. (: ; / ( ))
3. Hyphens - If used, Wanda will count the hyphenated word as one word. If the hyphen is omitted and replaced with a blank the separated words will be counted as two.
4. Apostrophes - Should not be used when a letter has been omitted. "Does not" when typed as "doesn't" will be counted as one word, two syllables. "Does not" will be counted as two words, three syllables.
5. Numbers and Abbreviations (without vowels) will be counted as one word and one syllable. DO NOT use periods unless you are at the end of the sentence. Abbreviations with vowels will follow the rules for the vowel syllable count.

We were explaining to each other one day why it couldn't be done when the idea flashed upon us. A syllable is a vowel.

The Doubtful Pairs

As we set up our paired-vowel rules, we found ourselves making tentative decisions, gambling that we would end up with the table odds. In some cases (calling ES a syllable but ED not a syllable) our decision was an out-and-out swap). In most cases we listed all the words we could think of containing those vowel combinations and made rational choices based on the likelihood of one over the other.

For instance, should OE be one syllable as in doe, foe, toe; or two as in poet, coerce, coefficient? Should

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Testing, cont'd...

OA be one syllable as in boat or coach; or two as in coagulate and coaxial? Should EI be one as in reign and sleigh; or two as in reinstate and reinvestigate?

In these cases we chose to consider the CO and RE as likely candidates for prefixes. In college-level material prefixes and suffixes abound. So, in all three cases we picked two syllables over one.

The IO combinations gave us trouble. Should we choose one as in notion, dominion, ration; or two as in bibliography, biology, biorhythm?

In this case we could have our cake and eat it, too. We called IO two syllables but ION one.

EO was interesting, since a word like **theory** is given either one or two, depending on which dictionary you read. We gave it two.

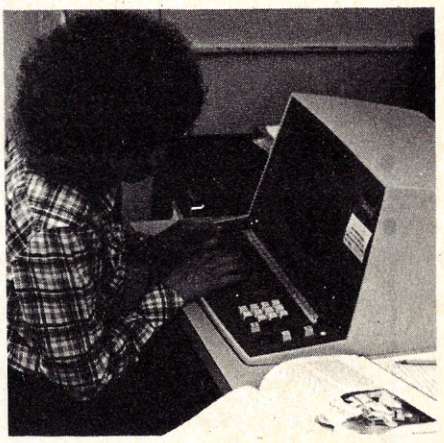
Like the amazing pedal-powered airplane, people may not like the way it looks or operates but the son-of-a-gun flies.

On the other hand we chose UA-1 over UA-2 (qualify over truant), IA-1 over IA-2 (partial over bias), UI-1 over UI-2 (quit over tuition) and IE-1 over IE-2 (belief over scientific).

Summary

What amazed us was that as we tacked the parts of the program together and tore them apart again things worked fairly well at all stages. The combination vowels threw the count off a little as we experimented, but not as much as we had anticipated.

Like the amazing pedal-powered airplane, people may not like the way it looks or operates but the son-of-a-gun flies.



"A paraprofessional can sit down at Wanda, load the program, type out 100 words, and wait for it all to happen."

We urge the reader to feed the program which follows into any computer of the sophistication level of the Wang 2200 and then compare the results with a "manual" or mental count. The results will be surprisingly close. We would also welcome refinements with open arms, and criticism with civility.

It is truly gratifying to know that in America today two people concerned with finding a way to get out of work, and armed with sincerity, dumb luck and a small computer, can conquer new worlds and keep the paraprofessionals off the walls. □

```
1  DIM T$(15)64
5 REM PROGRAM BY DONALD J. GOODMAN & SANDRA SCHWAB
10 PRINT :PRINT HEX(03),TAB(16),"FLESCH READABILITY SCALE"
12  PRINT "WHEN THE ? APPEARS ON THE LEFT OF THE SCREEN YOU MAY
TYPE IN THE100 WORD PASSAGE. WHEN YOU HAVE ENTERED AT LEAST 100
WORDS":
14 PRINT "WAIT & THE COMPUTER WILL COUNT THE AVERAGE NUMBER OF S
ENTENCES  WITHIN APPROXIMATELY 30 SECONDS, AND THE SYLLABLES COU
NT WITHIN ONE MINUTE"
16 PRINT "DO NOT TYPE BEYOND ONE WIDTH OF THE SCREEN"
18 REM C ALLOWS UP TO 15 LINES OF TEXT TO BE ENTERED. USUALLY 10
0 WORDS WILL BE COUNTED BEFORE THE END OF THE 15 LINES
19 REM IF THE TEXT IS VERY DIFICULT INCREASE C--BE WARE OF OVERF
LOW
20 FOR C= 1 TO 15
29 REM T$() IS USED FOR STORING EACH LINE OF YOUR TEXT
30 INPUT T$(C)
39 REM M IS SET EQUAL TO 64(FULL LENGTH OF SCREEN) UNTIL IT FIND
S THE 100TH WORD & Q= COUNTER FOR THE CHARACTERS IN EACH LINE
40 M=64
100 FOR Q=1 TO M
110 IF STR(T$(C),Q,1)=" " THEN 150
111 IF STR(T$(C),Q,1)="." THEN 140
112 IF STR(T$(C),Q,1)="?" THEN 140
113 IF STR(T$(C),Q,1)="!" THEN 140
115 IF Q>M  THEN 250
120 NEXT Q
130 GOTO 250
139 REM S= NUMBER OF SENTENCES
140 S=S+1
```

Testing, cont'd...

```
145 GOTO 115
150 IF STR(T$(C),Q+1,1) <>" " THEN 190
160 FOR K=Q TO 64
170 IF STR(T$(C),K,1)<>" " THEN 190
180 NEXT K
185 Q=K
189 REM W= NUMBER OF WORDS
190 W=W+1
210 IF W<100 THEN 115
220 PRINT :PRINT TAB(9);"YOU HAVE ENTERED MORE THAN 100 WORDS LE
T THE",TAB(15);"COMPUTER DO THE CALCULATIONS"
230 GOTO 430
250 NEXT C
430 IF S>=1 THEN 450
440 PRINT "YOU DO NOT HAVE A COMPLETE SENTENCE WITHIN YOUR 100 W
ORDS.":GOTO 499
450 PRINT "AVERAGE NUMBER OF WORDS IN EACH SENTENCE =  ",100/S
490 REM J= COUNTER FOR THE NUMBER OF LINES USED FOR YOUR 100 WOR
DS
499 M=64
500 FOR J=1 TO C
501 FOR Q=1 TO M
505 IF STR(T$(J),Q,1)<>" " THEN 520
506 IF Q= 1 THEN 530
507 IF STR(T$(J),Q-1,1)=" " THEN 530
508 FOR N=1 TO 10:IF Q-N<=0 THEN 700
509 IF STR(T$(J),Q-N,1)=" " THEN 700
510 IF STR(T$(J),Q-N,1)="A" THEN 517
511 IF STR(T$(J),Q-N,1)="E" THEN 517
512 IF STR(T$(J),Q-N,1)="I" THEN 517
513 IF STR(T$(J),Q-N,1)="O" THEN 517
514 IF STR(T$(J),Q-N,1)="U" THEN 517
515 IF STR(T$(J),Q-N,1)="Y" THEN 517
516 NEXT N:GOTO 710
517 N=10:GOTO 516
520 IF STR(T$(J),Q,1)="A" THEN 540
521 IF STR(T$(J),Q,1)="E" THEN 575
522 IF STR(T$(J),Q,1)="I" THEN 550
523 IF STR(T$(J),Q,1)="O" THEN 560
524 IF STR(T$(J),Q,1)="U" THEN 540
525 IF STR(T$(J),Q,1)="Y" THEN 600
530 NEXT Q:GOTO 720
540 IF STR(T$(J),Q+1,1)="I" THEN 620
541 IF STR(T$(J),Q+1,1)="A" THEN 620
542 IF STR(T$(J),Q+1,1)="E" THEN 620
543 IF STR(T$(J),Q+1,1)="U" THEN 620
544 IF STR(T$(J),Q+1,1)="Y" THEN 620
545 GOTO 700
550 IF STR(T$(J),Q+1,1)="E" THEN 620
551 IF STR(T$(J),Q+1,2)="ON" THEN 620
552 IF STR(T$(J),Q+1,1)="A" THEN 620
553 IF STR(T$(J),Q+1,1)="I" THEN 620
554 IF STR(T$(J),Q+1,1)="Y" THEN 620
559 GOTO 700
560 IF STR(T$(J),Q+1,1)="I" THEN 620
561 IF STR(T$(J),Q+1,1)="O" THEN 620
562 IF STR(T$(J),Q+1,1)="Y" THEN 620
563 IF STR(T$(J),Q+1,1)="U" THEN 620
565 GOTO 700
575 IF STR(T$(J),Q+1,1)="." THEN 579
576 IF STR(T$(J),Q+1,1)="!" THEN 579
577 IF STR(T$(J),Q+1,1)="?" THEN 579
578 IF STR(T$(J),Q+1,1)<>" " THEN 580
579 IF STR(T$(J),Q-1,1)="L" THEN 700:GOTO 582
580 IF STR(T$(J),Q+1,1)<>"D" THEN 541
582 FOR N=1 TO 10:IF Q-N<=0 THEN 700
583 IF STR(T$(J),Q-N,1)=" " THEN 700
584 IF STR(T$(J),Q-N,1)="A" THEN 595
585 IF STR(T$(J),Q-N,1)="E" THEN 595
586 IF STR(T$(J),Q-N,1)="I" THEN 595
587 IF STR(T$(J),Q-N,1)="O" THEN 595
588 IF STR(T$(J),Q-N,1)="U" THEN 595
589 IF STR(T$(J),Q-N,1)="Y" THEN 595
590 NEXT N:GOTO 710
595 N=10:GOTO 590
600 IF Q=1 THEN 710
610 IF STR(T$(J),Q-1,1)=" " THEN 710
619 REM Q IS A COUNTER FOR DETERMINING THE END OF A LINE OR THE
END OF THE 100TH WORD
620 Q=Q+1
699 REM A IS THE COUNTER FOR THE NUMBER OF SYLLABLES
700 A=A+1
710 IF Q<M THEN 530
720 IF J<C-1 THEN 740
730 M=L
740 NEXT J
800 PRINT "TOTAL NUMBER OF SYLLABLES IN YOUR 100 WORDS IS",A
810 PRINT :PRINT :PRINT TAB(9);"IF YOU WISH TO ENTER ADDITIONAL
PASSAGES PRESS:",TAB(16);"RUN AND THE RETURN(EXEC) KEYS"
```

Sentence Construction With A Computer

Robert L. Williams

The program described in this article, Abecedarian, is more a demonstration of some advanced techniques for natural language construction on a computer than a practical application. It's an interesting and worthwhile effort in its own right, but you may enjoy experimenting with the program. It's also a nice start in developing English CAI software (although the author points out that "Context is a massive problem in English CAI. Many folks just aren't aware of it.").

The program was designed for narrow screens and "standard" Basic so conversion shouldn't be too difficult. Note that the code uses string arrays and "&" as a string concatenation operator.

— SN

Abecedarian is a Basic program which attempts to show a portion of the English finite verb system at work. Abecedarian writes sentence-like constructions that show some of the ways a cluster of six closely related transitive lexical verbs, four modal verbs and two auxiliary verbs may appear separately or together.

1. A lexical verb alone:
   Sue *helps* her teacher.
2. The modal verb *will* added:
   Sue *will* help her teacher.
3. The auxiliary verb *have* added:
   Sue will *have* helped her teacher.
4. The auxiliary verb *be* added:
   Sue will have *been* helping her teacher.
5. An additional *be* added:
   Sue's teacher will have *been being* helped by her.

The last sentence-like construction may have tweaked your ear. If so, you've probably already determined that by the time you get the program into your processor your leg will have been being pulled far too long by Abecedarian. At that time it certainly should feel as if it had been being pulled. "Enough," you cry, "I have been being led astray by this paragraph!"

Actually, not one of the sentence-like constructions above is an "acceptable" sentence. They don't appear in contexts that allow them to be accepted as "live" sentences by you. A context is needed for the first sentence as much as one is needed for the last. For example, who is Sue? She hasn't been introduced. I'll do so now: Sue is a friend of mine. Now, assuming we both know of her and

Example 1

```
 1 >> JOE ANSWERS HIS LIBRARIAN.
          A SECOND FORM OF 1 IS:
       JOE DOES ANSWER HIS LIBRARIAN.

HAD SUE AND JOE'S CLASSMATES BEEN ANGERED BY THEM?
 26 >> YES, THEY HAD.

HAD MY CLASSMATE BEEN ANSWERED BY ME?
 26 >> YES, SHE HAD.

 23 >> WERE YOU BEING HELPED BY YOUR CLASSMATES?

 25 >> HAD JOE QUESTIONED HIS FRIENDS?

ARE YOU ANGERED BY YOUR FRIEND?
 2 >> YES, I AM.

HAD JOE'S LIBRARIANS BEEN HELPING HIM?
 28 >> YES, THEY HAD.

HAS JOE HELPED HIS LIBRARIANS?
 8 >> YES, HE HAS.

DID WE HELP OUR TEACHERS?
 16 >> YES, WE DID.

 27 >> HAD YOU BEEN ANSWERED BY YOUR LIBRARIAN?

DO I AID MY LIBRARIAN?
 0 >> YES, YOU DO.

 1 >> YOU QUESTION YOUR CLASSMATES.
          A SECOND FORM OF 1 IS:
       YOU DO QUESTION YOUR CLASSMATES.

 23 >> WAS JOE BEING ANSWERED BY HIS CLASSMATE?

DID SUE AND JOE'S HALL GUARDS QUESTION THEM?
 16 >> YES, THEY DID.

 3 >> IS MY TEACHER QUESTIONED BY ME?

 29 >> HAD SUE'S VISITORS BEEN AIDING HER?

 9 >> HAS JOE ANSWERED HIS FRIEND?

 23 >> WERE YOUR VISITORS BEING AVOIDED BY YOU?

 7 >> IS SUE'S HALL GUARD BEING QUESTIONED BY HER?

ARE YOU BEING AVOIDED BY YOUR TEACHERS?
 6 >> YES, I AM.

 21 >> WERE SUE AND JOE'S HALL GUARDS ANGERING THEM?

 19 >> WERE YOUR LIBRARIANS AVOIDED BY YOU?

 23 >> WERE WE BEING ANGERED BY OUR FRIEND?

HAVE SUE AND JOE BEEN AIDED BY THEIR TEACHER?
 10 >> YES, THEY HAVE.
```

Robert L. Williams, Ed.D. Assistant to the Academic Vice President, St. John's University, New York, Jamaica, NY 11439.

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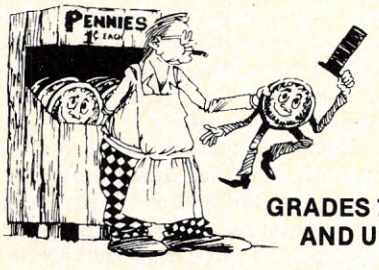

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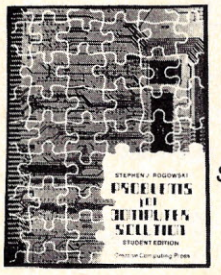

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Construction, cont'd . . .

that we know she has just one teacher —not more—would I say to you, "Sue helps her teacher?" Not likely. I might say "Sue *often* helps her teacher" or "Sue *sometimes* helps her teacher." Or I could say "Sue helps her teacher *whenever she can* ." In this instance, an adverb of frequency like *often* or an additional clause is needed. When we utter or write sentences we usually do so with understood contexts, contexts that give a point in time, a set of characters and a set of facts and events that we share with our listener or reader.

ABE doesn't offer appropriate contexts that include all of these features. Consequently, many of her sentence-like constructions may seem to offend your ear. All of them should.[1]

In one of her tantrums before she was three days old, ABE randomly rambled:

(Refer to Example 1)

At that time she was only happy with a 64 character screen. Here is a view of adolescent ABE conversing with a helpful friend with a smaller screen:

```
ABE          17 AUG 79  10:25

MY FIRST NAME IS ABECEDARIAN.
WHAT IS YOURS  ? TOM

TOM, LET'S WRITE SOME
SENTENCES ABOUT OURSELVES
AND TWO OTHERS, SUE AND JOE.

I NEED TO ASK SOME QUESTIONS.
ANSWER WITH NUMBERS.

HERE ARE SOME VERBS AND
NOUNS WE'LL USE:

 1 AID          1 FRIEND
 2 ANGER        2 CLASSMATE
 3 AVOID        3 VISITOR
 4 QUESTION     4 HALL GUARD
 5 HELP         5 TEACHER
 6 ANSWER       6 LIBRARIAN

CHOOSE A VERB (1-6)  ? 1

CHOOSE A NOUN (1-6)  ? 5

SHOULD 'TEACHER' BE
  1 SINGULAR OR 2 PLURAL  ? 1
SHOULD 'TEACHER' BE
  1 FEMALE OR 2 MALE  ? 2

WHO SHOULD OUR SENTENCE
  BE ABOUT?

 1 SUE          4 YOU
 2 JOE          5 YOU AND ME
 3 SUE AND JOE  6 ME

CHOOSE A NUMBER (1-6)  ? 3

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

1 THE TEACHER
 OR 2 SUE AND JOE ? 2

CHOOSE ANY NUMBER 0-159  ? 1
```

```
SUE AND JOE
  AID THEIR TEACHER.
   A SECOND FORM IS:
SUE AND JOE
  DO AID THEIR TEACHER.


CHOOSE A VERB (1-6)  ? 2

CHOOSE A NOUN (1-6)  ? 1
```

```
SHOULD 'FRIEND' BE
  1 SINGULAR OR 2 PLURAL  ? 2

WHO SHOULD OUR SENTENCE
  BE ABOUT?

 1 SUE          4 YOU
 2 JOE          5 YOU AND ME
 3 SUE AND JOE  6 ME

CHOOSE A NUMBER (1-6)  ? 6

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

1 THE FRIENDS
 OR 2 ME ? 1


CHOOSE ANY NUMBER 0-159  ? 32

WILL MY FRIENDS
  ANGER
  ME?
 32 >> YES, THEY WILL.


CHOOSE A VERB (1-6)  ? 3

CHOOSE A NOUN (1-6)  ? 3

SHOULD 'VISITOR' BE
  1 SINGULAR OR 2 PLURAL  ? 1
SHOULD 'VISITOR' BE
  1 FEMALE OR 2 MALE  ? 1

WHO SHOULD OUR SENTENCE
  BE ABOUT?

 1 SUE          4 YOU
 2 JOE          5 YOU AND ME
 3 SUE AND JOE  6 ME

CHOOSE A NUMBER (1-6)  ? 5

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?
1 THE VISITOR
 OR 2 US ? 1


CHOOSE ANY NUMBER 0-159  ? 16

DID OUR VISITOR
  AVOID US?
 16 >> YES, SHE DID.


CHOOSE A VERB (1-6)  ?
```

As you've noted, whenever you converse with ABE she asks you to choose the lexical verbs and nouns she's to gossip with. She then insists that you tell her whether the chosen noun is to be singular or plural. If the noun is to be singular, she asks whether it's to be a female or male person. ABE likes to satisfy her friends. She then asks who else is to be gossiped about, other friends, you, herself, or the two of you. Being precisely persistent, she then asks you to designate who's to be the grammatical subject. But in the end, she's all heart: she composes the predicates by herself. After all, she wouldn't want you to walk away saying that your leg had been being pulled. What ABE does do by herself is to string verb constructions together in a manner to suggest the extensiveness and some of the complexities of just a portion of the finite verb system.

You've probably already determined that by the time you get the program into your processor your leg will have been being pulled far too long by Abecedarian.

ABE's six lexical verbs are transitive ones, those that may be followed by objects.

Subject	Verb	Object
Sue	helps	her teacher (1)

Transitive verbs permit constructions that "reverse" subjects and objects.

Subject	Verb	Object (Agent)
Sue's teacher	is helped	by her (3)

Many of the verb constructions that ABE writes assume this reversal. You may enjoy selecting some other lexical verbs to teach a clone of ABE's. If you do, keep in mind that all of the subjects and objects are human.

What little grammar ABE has learned is to be found in a small portion of Martin Joos' **The English Verb: Form and Meaning.**[2] Joos postulates a binary schema that assigns either/or "values" to several features of finite verb predications. In turn, these values can be expressed in decimal numbers. His schema shows that all finite predications (verbs) may be described or coded with a five-place binary number.

ABE accepts decimal numbers. The numbers that describe verb constructions range from 1 through 159.[3] ABE analyzes these numbers in the subprogram 2610 through 2860. Essentially, she first strips off the modal values, if there are any, in lines 2660 through 2720, assigning a modal code. The remainder of the number (31-0) is then passed through a loop that assigns "binary" values to tense, phase, aspect, voice and function, terms and features far too complex to discuss here but to be found in Joos' book. ABE makes numerous other decisions to handle "number" agreement between the verbs and subjects

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The MAGIC WAND has probably the most responsive and easy-to-use editor available for either a serial or DMA terminal. It uses only single stroke control keys to give command and takes advantage of the special function keys on your terminal whenever possible. In addition, you can set up library files with coded sections that you can merge by section name.

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The MAGIC WAND allows you to set the left, right, top and bottom margins, page length, indentation, paragraph indentation, (incuding "hanging" paragraphs), text left flush, right flush, justified (two ways), literal or centered, variable line and pitch settings, variable spacing (including half lines), bold face, underlining (solid or broken), conditional hyphenation, sub- and superscripting. You may change any of these commands at run-time *without reformatting the file.*

Merging with external data files

You may access any external data file, with either fixed length or sequential records. The MAGIC WAND converts the record into variables that you define and can use like any other variable. Of course, you may use the data for automatic form letter generation. But you can also use it for report generation.

Variables

You may define up to 128 variables with names of up to seven characters. The current value of a variable may be up to 55 characters, and you may print it at any point in the text without affecting the current format. Although the MAGIC WAND stores the variables as strings, you may also treat them as integer numbers or format them with commas and a decimal point. You may increment or decrement numeric variables or use them in formatting commands.

Conditional commands

You may give any print command based on a run-time test of a pre-defined condition. The conditional test uses a straightforward IF statement, which allows you to test any logical condition of a variable. You may skip over unneeded portions of the file, select specific records to print, store more than one document in a single file, etc.

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CIRCLE 194 ON READER SERVICE CARD

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Construction, cont'd . . .

chosen. Among others, for example, 5 may produce these constructions:

Sue *is* helping her teacher.
You *are* helping your teacher.
I *am* helping my teacher.
Sue's teachers *are* helping her.

In these sentences, the *be* verb forms must agree in number with their subjects.

With the exceptions of 1 and 17, ABE writes her sentence-like constructions in yes/no question forms:

Whenever you converse with ABE she asks you to choose the lexical verbs and nouns she's to gossip with.

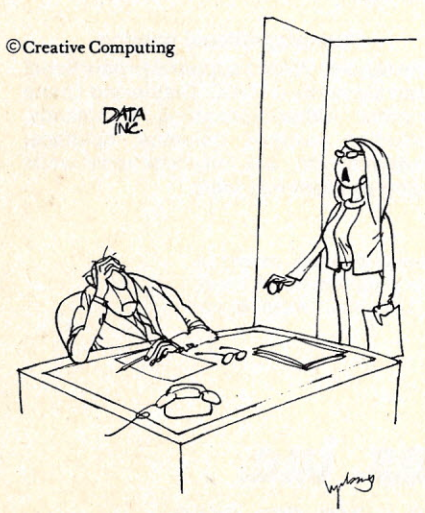
With the exceptions of 1 and 17, ABE writes her sentence-like constructions in yes/no question forms:

Is Sue helping her teacher? (5)
Is Sue being helped by her teacher? (7)

All odd numbers cause ABE to write "full" verb constructions—like *is helping* and *is being helped* above. Assuming the sentence characters are contextually "accepted" by you, questions seem to help lessen other context needs somewhat. But they also serve another purpose.

In Joos' schema even numbers account for "propredicates," features that most of us have traditionally called elliptical verbs.

Is Sue helping her teacher? (5)
4 Yes, she is. (helping her teacher)



"The supervisor eloped with the programmer..."

The yes response is followed only by a restatement of the subject—in pronoun form—and the auxiliary *is*. Since the lexical verb *helping* and the object *her teacher* don't appear, the verb construction in the response isn't "complete:" it's elliptical, or, as Joos notes, it's a *pro*predicate, in the manner of a *pro*noun standing in place of a noun. When an even numbered predicate is given to ABE, she writes the appropriate odd numbered question first and then writes a response to represent the even numbered elliptical or propredicate form. If 32 is given to ABE, she may write the following:

Will Sue help her teacher? (33)
32 Yes, she will.

You and ABE herself are sometimes characters when ABE writes, first and second persons. Whenever you determine ABE to be the subject

In the end, she's all heart: she composes the predicates by herself.

of a sentence, she will produce a question about herself, sometimes in this form:

Am I helping my teacher? (5)

As the person being addressed, you may find yourself thinking "If you don't know, who does!" or "How stupid to ask!" This is a problem of context, of sorts. However, if you give ABE the number 4, she may do the following:

Am I helping my teacher? (5)
(ABE asks about herself)
4 Yes, you are.
(As if you are replying)
Are you helping your teacher? (5)
(ABE asks about you)
4 Yes, I am.
(As if you are replying)

Thus, whenever ABE is given *you* or *me* to write about, she assumes first person in asking a question and you then in turn are assumed to be a first person giving a response.

Let's note some aspects of ABE's personality in the event you wish to clone her. First, she seems to be content to write on a 32 or 40 character screen. Second, she concatenates at times: lines 750, 1050, 1070 and 1150. Your clone may require minor surgery in these instances. Third, ABE learns her vocabulary by loop reading. If your clone is to MAT READ, you will need to rearrange some of her data dictionary. And, fourth, ABE doesn't understand ON...GO TO or ON...GO SUB: she loves to *IF* herself silly. Should your clone prefer not to be so iffy, there are some places ON's would prove helpful; but you should perform such microsurgery carefully.

Although ABE knows few words, she does seem to write a great deal, even though she always writes tongue out of context, not in cheek. □

Although ABE knows few words, she does seem to write a great deal, even though she always writes tongue out of context, not in cheek.

Footnotes

1. The "be-being" and "been-being" forms toyed with earlier pose euphonic problems for most speakers. But they sometimes do occur in spoken utterances, though very rarely. Most likely you've never read one before in print: they do require a courageous editor.
2. The University of Wisconsin Press, Madison and Milwaukee, 1964.
3. ABE's vocabulary has been stunted. Joos includes the additional modals must, ought to, dare and need. These, if ABE were to learn them, would extend her range from 159 to 223. Indeed, the quasi-auxiliaries be to, be going to, be about to, and have to might well be taught to ABE, with considerable patience of course.

```
100 DIM A$(6),D$(6),E$(6),F$(6)
110 DIM H$(6),B$(8),G$(9),C$(18),L(5)
120 FOR X=1 TO 6
130 READ A$(X)
140 READ D$(X)
150 READ E$(X)
160 READ F$(X)
170 READ H$(X)
180 NEXT X
190 FOR X=1 TO 8
200 READ B$(X)
210 NEXT X
220 FOR X=1 TO 9
230 READ G$(X)
240 NEXT X
250 FOR X=1 TO 18
260 READ C$(X)
270 NEXT X
280 PRINT "MY FIRST NAME IS ABECEDARIAN."
290 PRINT "WHAT IS YOURS  ";
300 INPUT Z$
310 IF Z$=G$(1) THEN 350
320 IF Z$=G$(2) THEN 350
330 LET Z=0
340 GO TO 360
350 LET Z=3
360 PRINT
370 PRINT Z$;", LET'S WRITE SOME"
380 PRINT "SENTENCES ABOUT OURSELVES"
390 PRINT "AND TWO OTHERS, ";G$(Z+3);"."
400 PRINT
410 PRINT "I NEED TO ASK SOME QUESTIONS."
420 PRINT "ANSWER WITH NUMBERS."
430 PRINT
440 PRINT "HERE ARE SOME VERBS AND"
450 PRINT "NOUNS WE'LL USE:"
460 PRINT
470 FOR X=1 TO 6
480 PRINT X;E$(X);TAB(13);X;F$(X)
490 NEXT X
500 FOR X=1 TO 25
510 PRINT
520 PRINT "CHOOSE A VERB (1-6)  ";
530 INPUT V
```

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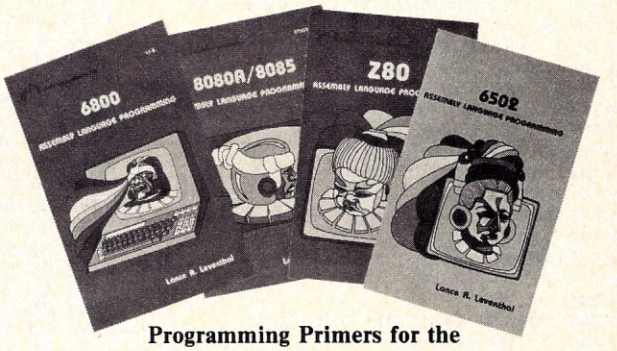

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This June, Osborne/McGraw-Hill will release the first of a new series, **The 8086 Book** by Russell Rector. A handbook for all 8086 users, this book includes basic 8086 programming instructions, a thorough analysis of the 8086 instruction set, and detailed hardware and interfacing guides that reveal the full power of the 8086 multiprocessing capabilities. Check the box in the order form below to be sent **The 8086 Book** order information.

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1084

Construction, cont'd . . .

```
540 IF V<1 THEN 520
550 IF V>6 THEN 520
560 PRINT
570 PRINT "CHOOSE A NOUN (1-6)  ";
580 INPUT F
590 IF F<1 THEN 570
600 IF F>6 THEN 570
610 PRINT
620 PRINT "SHOULD '";F$(F);"' BE"
630 PRINT "  1 SINGULAR OR 2 PLURAL  ";
640 INPUT N
650 IF N<1 THEN 620
660 IF N>2 THEN 620
670 IF N=2 THEN 750
680 PRINT "SHOULD '";F$(F);"' BE"
690 PRINT "  1 FEMALE OR 2 MALE  ";
700 INPUT R
710 IF R<1 THEN 680
720 IF R>2 THEN 680
730 LET F1$=F$(F)
740 GO TO 770
750 LET F1$=F$(F)&"S"
760 LET R=3
770 PRINT
780 PRINT "WHO SHOULD OUR SENTENCE"
790 PRINT "  BE ABOUT?"
800 PRINT
810 FOR X=1 TO 3
820 PRINT X;G$(X+Z);TAB(15);X+3;G$(X+6)
830 NEXT X
840 PRINT
850 PRINT "CHOOSE A NUMBER (1-6)  ";
860 INPUT C
870 IF C<1 THEN 850
880 IF C>6 THEN 850
890 PRINT
900 PRINT "WHO IS TO BE THE GRAMMATICAL"
910 PRINT "SUBJECT OF THE SENTENCE?"
920 PRINT
930 PRINT "1 THE ";F1$
940 PRINT " OR 2 ";
950 IF C>3 THEN 980
960 PRINT G$(C+Z);" ";
970 GO TO 990
980 PRINT C$(C+6);" ";
990 INPUT S
1000 IF S<1 THEN 930
1010 IF S>2 THEN 930
1020 PRINT
1030 IF S=2 THEN 1110
1040 IF C>3 THEN 1070
1050 LET C1$=G$(C)&"'S "&F1$
1060 GO TO 1080
1070 LET C1$=C$(C+12)&" "&F1$
1080 LET C2$=C$(C+6)
1090 LET C3$=C$(R)
1100 GO TO 1170
1110 IF C>3 THEN 1140
1120 LET C1$=G$(C)
1130 GO TO 1150
1140 LET C1$=C$(C)
1150 LET C2$=C$(C+12)&" "&F1$
1160 LET C3$=C$(C)
1170 PRINT
1180 PRINT "CHOOSE ANY NUMBER 0-159  ";
1190 INPUT Y
1200 PRINT
1210 IF Y<0 THEN 1180
1220 IF Y>159 THEN 1180
1230 GO SUB 2610
1240 IF S=1 THEN 1280
1250 IF C=6 THEN 1330
1260 IF C<3 THEN 1290
1270 GO TO 1310
1280 IF N=2 THEN 1310
1290 LET A=1
1300 GO TO 1340
1310 LET A=3
1320 GO TO 1340
1330 LET A=5
1340 LET A=A+D
1350 IF Y<2 THEN 1500
1360 IF Y=16 THEN 1500
1370 IF Y=17 THEN 1500
1380 IF M=0 THEN 1400
1390 LET M=M+D
1400 GO SUB 1630
1410 GO SUB 1680
1420 GO SUB 1760
1430 GO SUB 1830
1440 GO SUB 1890
1450 GO SUB 1950
1460 GO SUB 1990
1470 IF E=1 THEN 1570
1480 GO SUB 2130
1490 GO TO 1570
1500 IF Y=0 THEN 1560
1510 IF Y=16 THEN 1560
1520 GO SUB 1600
1530 GO SUB 2340
1540 GO SUB 2570
1550 GO TO 1570
1560 GO SUB 2450
1570 PRINT
1580 NEXT X
1590 STOP
1600 PRINT C1$
1610 PRINT TAB(2);
1620 RETURN
1630 IF M=0 THEN 1670
1640 PRINT B$(M);" ";
1650 GO SUB 1600
1660 LET J$=B$(M)
1670 RETURN
1680 IF H=0 THEN 1750
1690 IF M=0 THEN 1710
1700 LET A=3
1710 PRINT H$(A);" ";
1720 IF M>0 THEN 1750
1730 GO SUB 1600
1740 LET J$=H$(A)
1750 RETURN
1760 IF M=0 THEN 1820
1770 IF H=1 THEN 1820
1780 IF B=0 THEN 1800
1790 GO TO 1810
1800 IF G=0 THEN 1820
1810 PRINT "BE ";
1820 RETURN
1830 IF H=0 THEN 1880
1840 IF B=0 THEN 1860
1850 GO TO 1870
1860 IF G=0 THEN 1880
1870 PRINT "BEEN ";
1880 RETURN
1890 IF M>0 THEN 1940
1900 IF H=1 THEN 1940
1910 PRINT A$(A);" ";
1920 GO SUB 1600
1930 LET J$=A$(A)
1940 RETURN
1950 IF G=0 THEN 1980
1960 IF B=0 THEN 1980
1970 PRINT "BEING ";
1980 RETURN
1990 PRINT E$(V);
2000 IF B=1 THEN 2060
2010 IF G=1 THEN 2040
2020 IF H=1 THEN 2060
2030 GO TO 2070
2040 PRINT "ING";
2050 GO TO 2070
2060 PRINT "ED";
2070 PRINT
2080 PRINT TAB(2);
2090 IF B=0 THEN 2110
2100 PRINT "BY ";
2110 PRINT C2$;"?"
2120 RETURN
2130 IF C<4 THEN 2260
2140 IF C=5 THEN 2260
2150 IF S=1 THEN 2260
2160 IF C=4 THEN 2220
2170 LET C3$="YOU"
2180 IF M>0 THEN 2260
2190 IF H=1 THEN 2260
2200 LET J$=A$(A-2)
2210 GO TO 2260
2220 LET C3$="I"
2230 IF M>0 THEN 2260
2240 IF H=1 THEN 2260
2250 LET J$=A$(A+2)
2260 PRINT Y;">> YES, ";C3$;" ";J$;
2270 IF M=0 THEN 2320
2280 IF H=0 THEN 2320
2290 IF B=1 THEN 2310
2300 IF G=0 THEN 2320
2310 PRINT " HAVE";
2320 PRINT "."
2330 RETURN
2340 PRINT E$(V);
2350 IF D=1 THEN 2420
2360 IF S=1 THEN 2390
2370 IF C>2 THEN 2430
2380 GO TO 2400
2390 IF N=2 THEN 2430
2400 PRINT "S";
2410 GO TO 2430
2420 PRINT "ED";
2430 PRINT " ";C2$;"."
2440 RETURN
2450 PRINT D$(A);" ";C1$
2460 PRINT TAB(2);E$(V);" ";C2$;"?"
2470 IF S=1 THEN 2550
2480 IF C=4 THEN 2530
2490 IF C<6 THEN 2550
2500 LET C3$="YOU"
2510 LET A=A-2
2520 GO TO 2550
2530 LET C3$="I"
2540 LET A=A+2
2550 PRINT Y;">> YES, ";C3$;" ";D$(A);"."
2560 RETURN
2570 PRINT "   A SECOND FORM IS:"
2580 GO SUB 1600
2590 PRINT D$(A);" ";E$(V);" ";C2$;"."
2600 RETURN
2610 LET W=128
2620 LET M=0
2630 LET Q=16
2640 LET U=Y
2650 IF Y<32 THEN 2730
2660 FOR P=7 TO 1 STEP -2
2670 IF U<W THEN 2710
2680 LET M=P
2690 LET U=U-W
2700 GO TO 2730
2710 LET W=W-32
2720 NEXT P
2730 FOR P=5 TO 1 STEP -1
2740 IF U<Q THEN 2780
2750 LET L(6-P)=1
2760 LET U=U-Q
2770 GO TO 2790
2780 LET L(6-P)=0
2790 LET Q=Q/2
2800 NEXT P
2810 LET D=L(1)
2820 LET H=L(2)
2830 LET G=L(3)
2840 LET B=L(4)
2850 LET E=L(5)
2860 RETURN
2870 DATA IS,DOES,AID,FRIEND,HAS
2880 DATA WAS,DID,ANGER,CLASSMATE
2890 DATA HAD,ARE,DO,AVOID,VISITOR
2900 DATA HAVE,WERE,DID,QUESTION
2910 DATA HALL GUARD,HAD,AM,DO
2920 DATA HELP,TEACHER,HAVE,WAS
2930 DATA DID,ANSWER,LIBRARIAN
2940 DATA HAD,WILL,WOULD,SHALL
2950 DATA SHOULD,CAN,COULD,MAY
2960 DATA MIGHT,SUE,JOE,SUE AND JOE
2970 DATA ANN,SAM,ANN AND SAM,YOU
2980 DATA YOU AND ME,ME,SHE,HE
2990 DATA THEY,YOU,WE,I,HER,HIM
3000 DATA THEM,YOU,US,ME,HER,HIS
3010 DATA THEIR,YOUR,OUR,MY
3020 END
```

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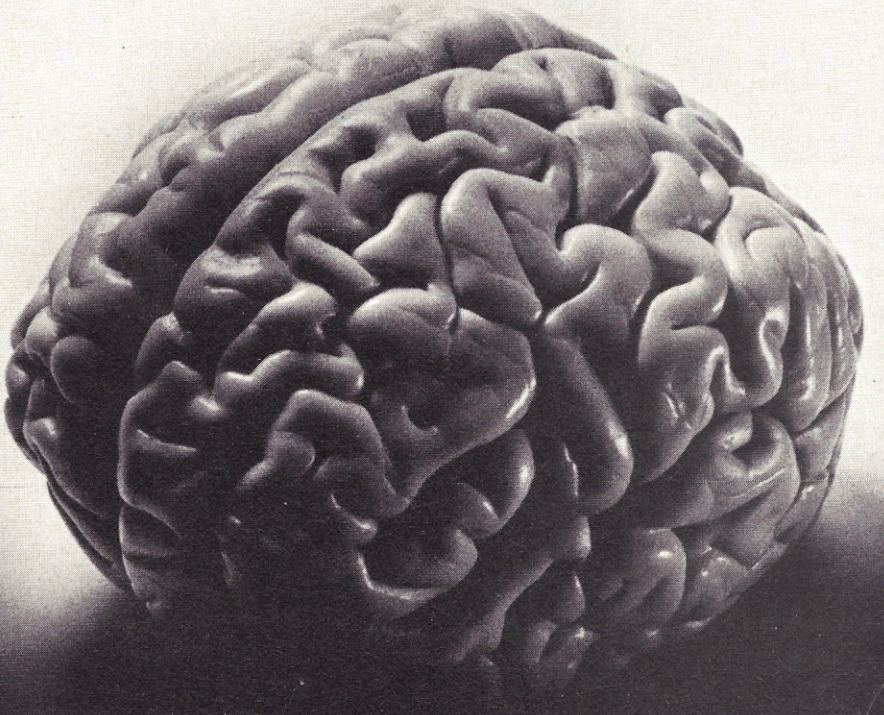

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CIRCLE 159 ON READER SERVICE CARD

Reading Level Difficulty

Ronald Carlson

There are several formulas, such as Fog Index or Flesch Scale, used to estimate the reading level of text books. Most of these formulas count the number of words, syllables, sentences and polysyllabic words. Other formulas tally the occurrences of certain key words from a specific list of words.

If you have a large quantity of samples to determine the reading level or if you need to find the reading level only on occasion, this program will calculate the approximate grade level of the material.

The Fog Index, developed by Robert Gunning, is based on the following formula:

Grade Level = .4 *(W + L)

W = number of words with 3 or more syllables
L = average sentence length

There are exceptions involving words that end with -ing or -ed or capitalized words.

In my BASIC program there is a slight variation from the original formulas, inasmuch as counting syllables is a formidable task. I've used an approximation, that any word that is nine letters or longer will be three or more syllables. I also count the number of words with three or more distinct vowels and average it with the approximation by length.

So far in all of the samples I've tested, this estimation is within .5 of the grade level stated for the material. It is suggested that you take several passages, about 100 words long, throughout the book to receive an accurate measure of the grade level of that book.

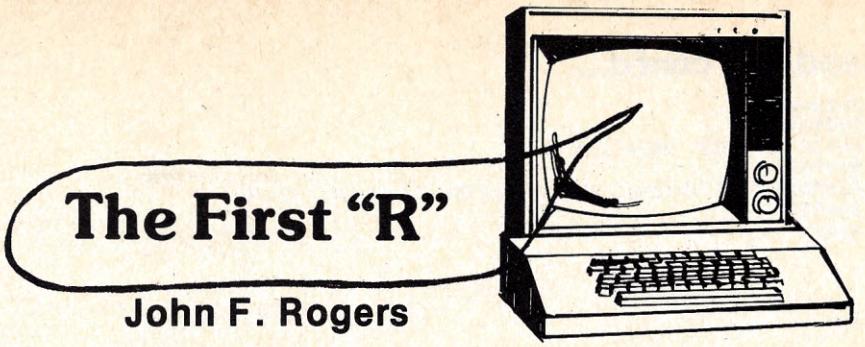
Ronald Carlson, 44825 Kirk Ct., Canton, MI 48187


```
10REM
20REM READING LEVEL DIFFICULTY
30REM R. CARLSON
40REM CANTON, MICH.
50REM
60DIM A$(100)
70R1=0
80N=0
90D=0
100PRINT "DIRECTIONS"
110PRINT
120PRINT"PLEASE DELETE ALL PUNCTUATION EXCEPT AT THE END OF A SENTENCE ."
130PRINT"PLEASE TYPE A SPACE BEFORE THIS PUNCTUATION .THE ACCURACY"
140PRINT"WILL BE INCREASED IF YOU CHOOSE SEVERAL PASSAGES THROUGHOUT"
150PRINT"THE BOOK ."
160PRINT
170INPUT "HOW MANY LINES OF TEXT ",A
180PRINT"TYPE IN THE PASSAGE,ONE LINE AT A TIME."
190PRINT
200S=0
210W=0
220L=0
230T=0
240T1=0
250V=0
260FOR B=1 TO A
270INPUT A$
280X=LEN(A$)
290IF A$(X,X)="," THEN 420
300IF A$(X,X)="!" THEN 420
310IF A$(X,X)="?" THEN 420
320A$=A$+" "
330REM T IS NUMBER OF 3 SYLLABLE WORDS
340REM T1 IS THE NUMBER OF THREE SYLLABLE WORDS USING VOWELS
350REM L IS THE NUMBER OF LETTERS IN A WORD
360REM S IS THE NUMBER OF SENTENCES
370REM W IS THE NUMBER OF WORDS
380REM V IS THE NUMBER OF VOWELS /WORD
390REM D IS AN INDICATOR FOR DIPTHONGS
400REM N IS THE NUMBER OF SAMPLES
410REM R1 IS THE RUNNING TOTAL OF THE READING LEVELS
420FOR C=1TO LEN(A$)
430T$=A$(C,C)
440 IF T$="," THEN 600
450 IF T$="!" THEN 600
460 IF T$="?" THEN 600
470IF T$=" " THEN 620
480REM TRIPPING THE VARIOUS COUNTERS
490L=L+1
500IF T$="A" THEN 570
510IF T$="E" THEN 570
520IF T$="I" THEN 570
530IF T$="O" THEN 570
540IF T$="U" THEN 570
550D=0
560GOTO 680
570 D=D+1
580IF D=1 THEN V=V+1
590GOTO680
600S=S+1
610GOTO680
620W=W+1
630D=0
640IF L>=9 THEN T=T+1
650L=0
660IF V>=3 THEN T1=T1+1
670V=0
680NEXT C
690NEXT B
700T=INT((T+T1)/2)
710R=.4*(T+W/S)
720PRINT
730PRINT"THE READING LEVEL FOR THIS PASSAGE IS APPROXIMATELY ";R
740PRINT T;" THREE SYLLABLE WORDS"
750PRINT W;" WORDS IN THIS PASSAGE"
760PRINT S;" SENTENCES"
770INPUT"DO YOU HAVE MORE MATERIAL ? ",A$
```

Reading, cont'd...

```
780N=N+1
790R1=R1+R
800IF A$="YES" THEN 170
810PRINT
820PRINT"THE OVERALL READING LEVEL IS GRADE ";R1/N
830END
READY


RUN

DIRECTIONS

PLEASE DELETE ALL PUNCTUATION EXCEPT AT THE END OF A SENTENCE .
PLEASE TYPE A SPACE BEFORE THIS PUNCTUATION .THE ACCURACY
WILL BE INCREASED IF YOU CHOOSE SEVERAL PASSAGES THROUGHOUT
THE BOOK .

HOW MANY LINES OF TEXT 10
TYPE IN THE PASSAGE,ONE LINE AT A TIME.

?WE FEEL THIS IS MUCH TOO LITTLE COMING MUCH TOO
?LATE .IN THAT SENSE WE FEEL HIS PROGRAM IS NOT SUFFICIENTLY
?STRONG ENOUGH .WE FEEL HE SHOULD PROPOSE TO CUT DOWN
?BY AT LEAST 10 PERCENT IN TWO MONTHS RATHER THAN 50
?PERCENT IN 10 YEARS .NOW HE CAN CUT THE DEMAND BY 10
?PERCENT IN TWO MONTHS WE FEEL WITH A PROGRAM OF EDUCATING
?AMERICANS .WE CALL ON HIM TO ALLOCATE $100 MILLION
?FROM THE DEPARTMENT OF ENERGY TO EDUCATE THE AMERICAN
?PEOPLE HOW TO CONSERVE ENERGY HOW NOT TO USE
?THEIR CARS TAKE ONE MINUTE HOT SHOWERS .

THE READING LEVEL FOR THIS PASSAGE IS APPROXIMATELY  10.72
 7 THREE SYLLABLE WORDS
 99 WORDS IN THIS PASSAGE
 5 SENTENCES
DO YOU HAVE MORE MATERIAL ? NO

THE OVERALL READING LEVEL IS GRADE  10.72
READY
```

Reading Practice with the TRS-80 Voice Synthesizer



John F. Rogers

"Reading, Riting, and Rithmetic" — the "Three R's." Without the first "R," a person can have much difficulty in this Age of Information. If a child is having reading troubles, perhaps a little extra drill would be appropriate. The program "Reading Practice with the TRS-80 Voice Synthesizer" may be suitable for such extra drill.

The Radio Shack TRS-80 Voice Synthesizer gives your microcomputer the ability to speak. (See "Phonetically Speaking," June 1979, *Creative Computing.)* This program utilizes that ability to give a student drill in reading and saying the basic words that should be known at a given age.

The Dolch Basic Sight Word List contains 212 words that the average third grade child should recognize. (You should be able to get a copy of the Dolch List from your nearby primary school.) By listing those words which comprise 50% to 75% of all reading matter in a DATA statement along with their Voice Synthesizer phonetic spellings, you can give a student drill in retaining those words in his reading and speaking vocabularies.

Program REMarks

The program is written in Radio Shack Level II Basic, but it can be adapted to Level I or to other Basics.

Lines 20-100 give the student instructions in how the drill will proceed. Both written and spoken instructions are given throughout the program.

Lines 110-155 present the words that are to be spoken by the student. Subroutine 500 actually writes the word on the screen and gives the correct pronunciation. For emphasis, the word blinks inside a graphics rectangle.

In lines 170-200, the computer asks the student to repeat the word once more along with the computer.

Subroutine 400 outlines the screen — a "dress-up" to set off the written instructions.

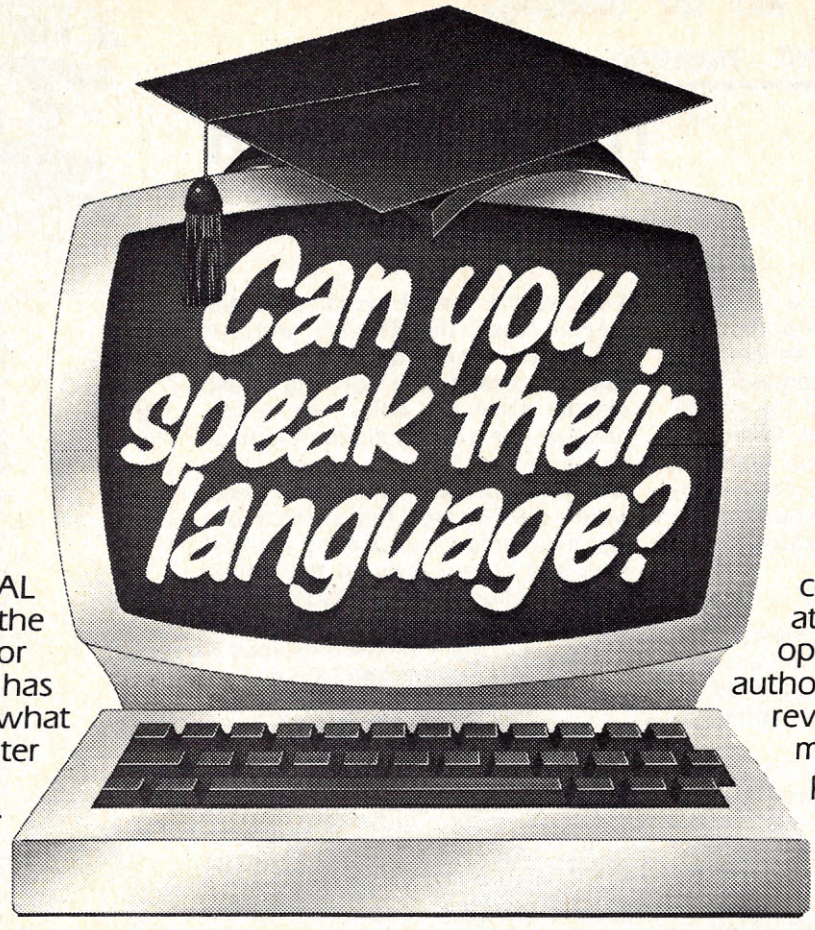
Subroutines 1000 and 1100 send the phonetic spellings of words to be spoken to the Voice Synthesizer.

Subroutine 2000 is used by the programmer to check the pronunciations of words to be listed in the DATA statements to ensure clarity and correctness. (Just enter RUN 2000.)

Lines 300 and following contains the DATA statement listings of the words to be read and spoken. The numbers are important for correct execution of the program. □

John F. Rogers, 600 Seventh St., Morgan City, LA 70380.

```
1 REM ***       READING PRACTICE       ***
2 REM ***       WITH THE TRS-80        ***
3 REM ***      VOICE SYNTHESIZER       ***
4 REM ***        PROGRAM BY            ***
5 REM ***      JOHN F.  ROGERS         ***
6 REM ***      600 SEVENTH ST.         ***
7 REM ***      MORGAN CITY,            ***
8 REM ***      LOUISIANA 70380         ***
9 REM ***                              ***
10 CLS:GOSUB 400
20 PRINT@150,"H E L L O -";:VO$="H38L8[U":GOSUB 1000:FOR K=0 TO 600:NEXT
30 PRINT@270,"TODAY YOU WILL PRACTICE";:VO$="T(UD@*&Y'UW!ILLPR99KT!IS":GOSUB 1000
35 FOR K=0 TO 960:NEXT
40 PRINT@404,"SAYING WORDS I SHOW YOU.";:VO$="S@@&E+W/RDZ;5#&>>OOWY'U":GOSUB 1000
50 FOR I=0 TO 1500:NEXT
60 CLS:GOSUB 400
70 PRINT@140,"I WILL FLASH A WORD ON THE SCREEN,";
75 VO$=";5#&W!ILLFL79>>66W/RD":GOSUB 1000:FOR K=0 TO 800:NEXT
80 VO$=";ANN<67SKR ENN":GOSUB 1000:FOR K=0 TO 600:NEXT
85 PRINT@280,"THEN YOU WILL SAY IT.";:VO$="<<35NY'UW!ILLS@@&!IT":GOSUB 1000:FOR K=0 TO 1200:NEXT
90 PRINT@404,"THEN  I  WILL SAY THE WORD.";:VO$="<<35N0;5#& W!ILLS@@&<67W/RD":GOSUB 1000
95 FOR K=0 TO 1400:NEXT:PRINT@520,"FINALLY,  WE'LL SAY THE WORD TOGETHER.";
100 VO$="F;#&N8LE& W.&&LS@@&<67W/RD":GOSUB 1000:FOR K=0 TO 1040:NEXT:VO$="T(UG35<</R":GOSUB 1000
105 FOR K=0 TO 1500:NEXT
110 CLS:GOSUB 400:PRINT@217,"R E A D Y ?";:VO$="R345DE&":GOSUB 1000:FOR K=0 TO 1000:NEXT
120 CLS:GOSUB 400
130 PRINT@140,"THE FIRST WORD IS...";:VO$="<.F/RSTW/RD!IZZ":GOSUB 1000:FOR K=0 TO 600:NEXT
135 READ Z,S$,WD$:GOSUB 500:GOTO 160
140 CLS:GOSUB 400:ON ERROR GOTO 900:READ Z
150 PRINT@140,"THE NEXT WORD IS...";:VO$="<.N35KSTW/RD!IZZ":GOSUB 1000
155 READ S$,WD$:GOSUB 500
160 CLS:GOSUB 400
170 PRINT@140,"DID YOU SAY THE WORD CORRECTLY?";
175 VO$="D!IDDY'US@@&<67W/RDKOR45KTLE&":GOSUB 1000:FOR K=0 TO 1200:NEXT
180 PRINT@265,"LET'S SAY IT TOGETHER:";:VO$="L35TS0S@@&!IT0T(UG35<</R":GOSUB 1000
185 FOR K=0 TO 1000:NEXT
190 PRINT@404,"R E A D Y ?";:VO$="R345DE&":GOSUB 1000:FOR K=0 TO 600:NEXT
200 PRINT@530,"THE WORD IS:  ";S$;:VO$="<67W//RD!IZZ":GOSUB 1000:GOSUB 1100
210 FOR I=0 TO 1800:NEXT:GOTO 140
300 DATA 1,CLEAN,KLL. ENN,2,HURT,HH//RT,3,GREEN,GRR. ENN,4,LAUGH,LL99FF
400 FOR I=0 TO 62 STEP 2:PRINT@I,"#";:NEXT
405 FOR I=64 TO 832 STEP 64:PRINT@I,"#";:PRINT@I+62,"#";:NEXT
410 FOR I=896 TO 958 STEP 2:PRINT@I,"#";:NEXT
420 RETURN
500 FOR J=35 TO 94:SET(J,11):SET(J,22):NEXT
505 FOR J=11 TO 22:SET(35,J):SET(94,J):NEXT
510 FOR I=0 TO 7:PRINT@348,"  ";:FOR J=0 TO 100:NEXT J:PRINT@348,S$;:FOR J=0 TO 600:NEXT .
520 PRINT@590,"THE WORD IS PRONOUNCED...";:VO$="<67W/RD!IZZPRON;UNST":GOSUB 1000
525 GOSUB 1100:FOR I=0 TO 1600:NEXT:GOSUB 1100:FOR J=0 TO 1500:NEXT
530 RETURN
900 CLS:GOSUB 400
910 PRINT@130,"THE WORD LIST HAS ENDED.";:VO$="<77W/RDL!IST0H99Z035ND4D":GOSUB 1000
915 FOR K=0 TO 1000:NEXT
920 PRINT@260,"PLEASE CALL THE INSTRUCTOR.";:VO$="PL.EZK122LL0<.INSTR67KT/":GOSUB 1000
930 RESUME 950
950 FOR I=0 TO 1500:NEXT
960 PRINT@390,"THE DATA LIST OF WORDS";:PRINT@479,"HAS BEEN DEPLETED.";
970 PRINT@576,"PRESS 'BREAK' KEY TO GET CONTROL OF THE COMPUTER:";:GOTO 970
1000 POKE 16383,63:POKE 16383,32
1010 FOR VX=1 TO LEN(VO$)
1020 POKE 16383,ASC(MID$(VO$,VX,1))
1030 NEXT VX
1040 POKE 16383,32:POKE 16383,63:POKE 16383,32
1050 RETURN
1100 POKE 16383,63:POKE 16383,32
1110 FOR VX=1 TO LEN(WD$)
1120 POKE 16383,ASC(MID$(WD$,VX,1))
1130 NEXT VX
1140 POKE 16383,32:POKE 16383,63:POKE 16383,32
1150 RETURN
2000 CLS
2010 PRINT@0,"THIS IS THE PRONUNCIATION TESTING ROUTINE:";
2020 PRINT@128,VO$
2030 PRINT@192,"ENTER PHONEMES..."
2040 INPUT VO$:GOSUB 1000
2050 GOTO 2000
```



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CIRCLE 142 ON READER SERVICE CARD

An educational aid for language teaching and learning.

The Word Board

Howard Berenbon

Are you looking for a practical application for your home computer? Are you interested in educational applications or experimenting with new devices that can aid the handicapped? Then the "Word Board" is just the program for you. Using a TRS-80 Level II, Apple or Pet microcomputer, you can turn your system into a language communicator.

Program 1

The "Word Board" accepts keyboard entry of individual letters and displays single words assigned to each letter. Its use is unlimited in educational applications.

The "Word Board" may be used to aid in language instruction by assigning English words to each of the 26 keys, for letters A through Z. For each English word covering a key, its French, German, Italian or Spanish equivalent can be displayed. Program 1 allows the French word to be displayed when the English word is depressed. The words are printed towards the center of the video display after the enter key is depressed. It's a handy aid for language students to help in memorizing foreign vocabulary words. After the 26 words are learned, the student can test his memory by covering the keytops and typing through the list to review the vocabulary. (Figure 1a is a sample RUN of Program 1 and Figure 1b is a list of the French words used.)

A variation of this "Word Board" is to place small pictures on the keytops and have the pictures access their foreign meanings. Program lines 600 through 1630 hold the French words in "PRINT" statements. An additional 10 keys, 1 through 0, are used to access their equivalent numbers in French. The " " sign is used to skip 8 lines, with lines 1640 to 1670. The words may be changed for different vocabulary sets and different languages.

Howard Berenbon, 2681 Peterboro, W. Bloomfield, MI 48033.

Key	English Word	French Word
A	Apple	Pomme
B	Airplane	Avion
C	Cup	Tasse
D	Cow	Vache
E	Coat	Veston
F	Dog	Chien
G	Hand	Main
H	Sun	Soleil
I	Book	Livre
J	Moon	Lune
K	Ear	Oreille
L	Cloud	Nuage
M	Comb	Peigne
N	Eyes	Yeux
O	Ice	Glace
P	Star	Etoile
Q	Spoon	Cuillere
R	Chair	Chaise
S	Horse	Cheval
T	Pencil	Crayon
U	Lamp	Lampe
V	Bird	Oiseau
W	Fish	Poissen
X	Bicycle	Velo
Y	Cat	Chat
Z	Hat	Chapeau
1	One	Un
2	Two	Deux
3	Three	Trois
4	Four	Quatre
5	Five	Cinq
6	Six	Six
7	Seven	Sept
8	Eight	Huit
9	Nine	Neuf
0	Zero	Zero
a	(skip 8 lines)	

Figure 1b—French Vocabulary Words

```
WORD BOARD: VOCABULARY-ENGLISH TO FRENCH

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ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS
WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS
ENTERING AN '@' WILL SKIP 8 LINES
MAY BE USED AS A LANGUAGE INSTRUCTION AID

ENGLISH         FRENCH
-------         ------

SPOON           CUILLERE


ENGLISH         FRENCH
-------         ------

APPLE           POMME


ENGLISH         FRENCH
-------         ------

HAT             CHAPEAU


ENGLISH         FRENCH
-------         ------

FISH            POISSEN
```
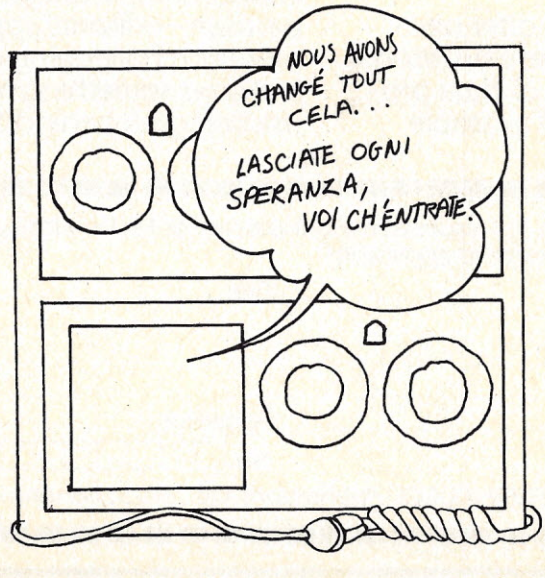

Figure 1a



Program 2

The second program uses the "Word Board" as a language communicator for the handicapped. A speech handicapped person may communicate using this program. A very limited vocabulary of 26 essential words (see Figure 2) and numbers 1 through 0 are assigned to the keys.

You may also place the foreign meanings of the words on the keytops and have their English equivalents displayed when each key is depressed. Have the student read the word on the keytop and recite the English meaning, then depress the key to find the correct meaning.

The program can be used as a computer dictionary. The meaning of words, assigned to each key, may be stored in sentence form at lines 600 through 1630. Each time a key is depressed, the meaning of the word assigned to the key is displayed.

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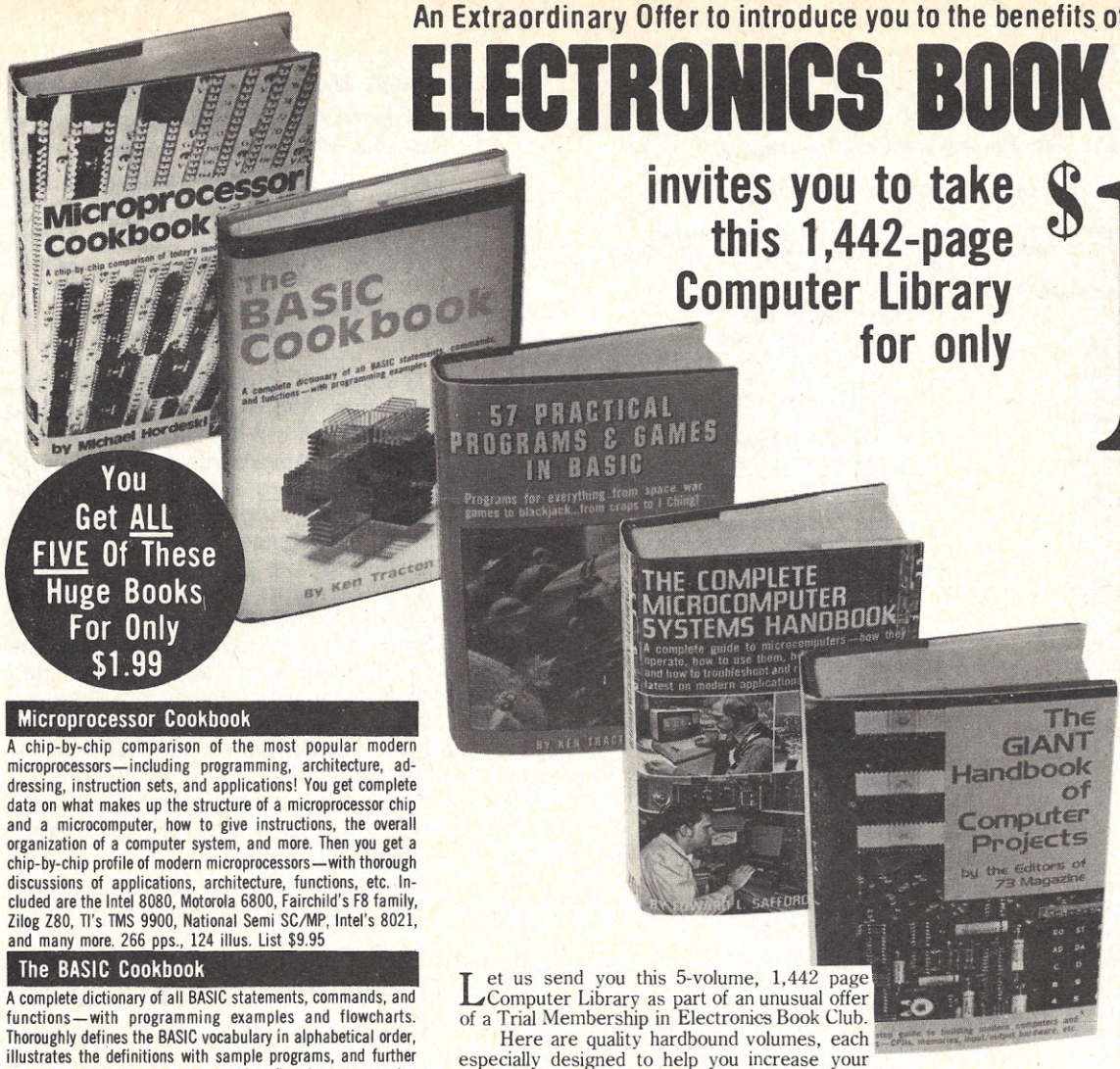

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Word Board, cont'd...

Program 1

```
0010 PRINT "WORD BOARD: VOCABULARY-ENGLISH TO FRENCH"
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0065 PRINT "ENTERING AN '@' WILL SKIP 8 LINES"
0070 PRINT "MAY BE USED AS A LANGUAGE INSTRUCTION AID"
0100 INPUT A$
0105 PRINT
0110 IF A$="A" THEN 600
0120 IF A$="B" THEN 640
0130 IF A$="C" THEN 670
0140 IF A$="D" THEN 700
0150 IF A$="E" THEN 730
0160 IF A$="F" THEN 760
0170 IF A$="G" THEN 790
0180 IF A$="H" THEN 810
0190 IF A$="I" THEN 840
0200 IF A$="J" THEN 870
0210 IF A$="K" THEN 910
0220 IF A$="L" THEN 940
0230 IF A$="M" THEN 970
0240 IF A$="N" THEN 1010
0250 IF A$="O" THEN 1040
0260 IF A$="P" THEN 1070
0270 IF A$="Q" THEN 1110
0280 IF A$="R" THEN 1140
0290 IF A$="S" THEN 1170
0300 IF A$="T" THEN 1210
0310 IF A$="U" THEN 1240
0320 IF A$="V" THEN 1270
0330 IF A$="W" THEN 1310
0340 IF A$="X" THEN 1340
0350 IF A$="Y" THEN 1370
0360 IF A$="Z" THEN 1410
0370 IF A$="1" THEN 1440
0380 IF A$="2" THEN 1460
0390 IF A$="3" THEN 1480
0400 IF A$="4" THEN 1500
0410 IF A$="5" THEN 1520
0420 IF A$="6" THEN 1540
0430 IF A$="7" THEN 1560
0440 IF A$="8" THEN 1580
0450 IF A$="9" THEN 1600
0460 IF A$="0" THEN 1620
0470 IF A$="@" THEN 1640
0480 GOTO 100
0600 GOSUB 1700
0610 PRINT "APPLE";TAB(20);"POMME"
0630 GOTO 100
0640 GOSUB 1700
0650 PRINT "AIRPLANE";TAB(20);"AVION"
0660 GOTO 100
0670 GOSUB 1700
0680 PRINT "CUP";TAB(20);"TASSE"
0690 GOTO 100
0700 GOSUB 1700
0710 PRINT "COW";TAB(20);"VACHE"
0720 GOTO 100
0730 GOSUB 1700
0740 PRINT "COAT";TAB(20);"VESTON"
0750 GOTO 100
0760 GOSUB 1700
0770 PRINT "DOG";TAB(20);"CHIEN"
0780 GOTO 100
0790 GOSUB 1700
0800 PRINT "HAND";TAB(20);"MAIN"
0805 GOTO 100
0810 GOSUB 1700
0820 PRINT "SUN";TAB(20);"SOLEIL"
0830 GOTO 100
0840 GOSUB 1700
0850 PRINT "BOOK";TAB(20);"LIVRE"
0860 GOTO 100
0870 GOSUB 1700
0880 PRINT "MOON";TAB(20);"LUNE"
0890 GOTO 100
0910 GOSUB 1700
0920 PRINT "EAR";TAB(20);"OREILLE"
0930 GOTO 100
0940 GOSUB 1700
0950 PRINT "CLOUD";TAB(20);"NUAGE"
0960 GOTO 100
0970 GOSUB 1700
0980 PRINT "COMB";TAB(20);"PEIGNE"
0990 GOTO 100
1010 GOSUB 1700
1020 PRINT "EYES";TAB(20);"YEUX"
1030 GOTO 100
1040 GOSUB 1700
1050 PRINT "ICE";TAB(20);"GLACE"
1060 GOTO 100
1070 GOSUB 1700
1080 PRINT "STAR";TAB(20);"ETOILE"
1090 GOTO 100
1110 GOSUB 1700
1120 PRINT "SPOON";TAB(20);"CUILLERE"
1130 GOTO 100
1140 GOSUB 1700
1150 PRINT "CHAIR";TAB(20);"CHAISE"
1160 GOTO 100
1170 GOSUB 1700
1180 PRINT "HORSE";TAB(20);"CHEVAL"
1190 GOTO 100
1210 GOSUB 1700
1220 PRINT "PENCIL";TAB(20);"CRAYON"
1230 GOTO 100
1240 GOSUB 1700
1250 PRINT "LAMP";TAB(20);"LAMPE"
1260 GOTO 100
1270 GOSUB 1700
1280 PRINT "BIRD";TAB(20);"OISEAU"
1290 GOTO 100
1310 GOSUB 1700
1320 PRINT "FISH";TAB(20);"POISSEN"
1330 GOTO 100
1340 GOSUB 1700
1350 PRINT "BICYCLE";TAB(20);"VELO"
1360 GOTO 100
1370 GOSUB 1700
1380 PRINT "CAT";TAB(20);"CHAT"
1390 GOTO 100
1410 GOSUB 1700
1420 PRINT "HAT";TAB(20);"CHAPEAU"
1430 GOTO 100
1440 GOSUB 1700
1445 PRINT "ONE";TAB(20);"UN"
1450 GOTO 100
1460 GOSUB 1700
1465 PRINT "TWO";TAB(20);"DEUX"
1470 GOTO 100
1480 GOSUB 1700
1485 PRINT "THREE";TAB(20);"TROIS"
1490 GOTO 100
1500 GOSUB 1700
1505 PRINT "FOUR";TAB(20);"QUATRE"
1510 GOTO 100
1520 GOSUB 1700
1525 PRINT "FIVE";TAB(20);"CINQ"
1530 GOTO 100
1540 GOSUB 1700
1545 PRINT "SIX";TAB(20);"SIX"
1550 GOTO 100
1560 GOSUB 1700
1565 PRINT "SEVEN";TAB(20);"SEPT"
1570 GOTO 100
1580 GOSUB 1700
1585 PRINT "EIGHT";TAB(20);"HUIT"
1590 GOTO 100
1600 GOSUB 1700
1605 PRINT "NINE";TAB(20);"NEUF"
1610 GOTO 100
1620 GOSUB 1700
1625 PRINT "ZERO";TAB(20);"ZERO"
1630 GOTO 100
1640 FOR I=1 TO 8
1650 PRINT
1660 NEXT I
1670 GOTO 100
1700 PRINT "ENGLISH";TAB(20);"FRENCH"
1710 PRINT "-------";TAB(20);"------"
1720 PRINT
1740 RETURN
```

1 = 1	2 = 2	3 = 3	4 = 4	5 = 5
6 = 6	7 = 7	8 = 8	9 = 9	0 = 0
Q = I	W = it	E = is	R = do	T = go
Y = sleep	U = here	I = please	O = yes	P = no
A = he	S = you	D = are	F = want	G = drink
H = speak	J = happy	K = thank you	L = okay	
a = (skip 8 lines)	Z = she	X = am	C = like	
V = to	B = eat	N = time	M = not	

Figure 2. A Limited Vocabulary of 26 Essential Words and 10 Numbers

The speech impaired individual may use this "Word Board" to "talk" to others with the aid of the computer. Only two movements are required to use the "Word Board" - typing the word and typing enter to display the word. Sentences may be formed calling for the persons basic needs, such as eating and sleeping. Alternately, sentences may replace the words for more clearly describing the individuals wants and needs. Then depressing a certain key can display a whole sentence, such as "I am hungry, when do we eat?" Of course, the sentence won't fit on the keytop, so the handicapped person will have to choose from a list of letters with assigned sentences.

The home computer system may be less expensive than other devices that are used to aid the handicapped.

Regardless of the "Word Board" version you use, you can see that your home computer may be more useful than you ever imagined. Expand on program 1 for your educational needs. Develop a more detailed language instruction program, with several lists of vocabulary. Use it to increase your English vocabulary by accessing and learn the meanings of 10 new words a week. The microcomputer is a great learning tool, but you have to write the programs to utilize your system.

You may or may not have an application for program 2. But you might want to find organizations in your area that help the handicapped. Show them the "Word Board." They may not know that a home computer system can aid the handicapped, and your application may be useful to them. The home computer system may be less expensive than other devices that are used to aid the handicapped, and you would be doing a service to the community by demonstrating your system. Direct them to your local area computer store and suggest a system. □

SUPER SOFTWARE FOR THE TRS-80*

UTILITIES

Ramedit — By V. B. Hester©1979 - Change a specific item throughout a BASIC program without searching/editing each line. A machine language program 157 times faster than BASIC. ..... 32K-48K Disk $34.95

ST80-D™ By L. Micklus — Contains extensions for disk drive systems to exchange files with a time sharing computer or another TRS-80. ..... Disk $79.95

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Renumber — By L. Micklus - A two program package that contains a renumbering utility and a rescue routine. ..... Cass $7.95

Renumx — By L. Micklus - All three of the above programs on one cassette. ..... Cass $24.95

BUSINESS

Mailing Lister II — By L4 - Designed to handle files of up to 350 names. Prints client listings or mailing labels. Sorts in 10 seconds. ... Disk $79.95

Inventory II — By L4 - Keeps an inventory of up to 6,000 items with four drives (1,000 items with one drive). Complete print-outs of the total sales of the day, cost of the sales and the gross profits. ..... Disk $99.00

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GAMES

Invaders/sound — By L4 - Based on the arcade game. You must defend the earth from the colony of aliens who are invading it. Five skill levels. Machine language program. ..... Cass. $14.95

Creature Tic-Tac-Toe/sound — By L4 - Played in a conventional grid. Creatures appear as your markers. .... Cass $9.50

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Space Battle — By L4 - Command a small mercenary star-cruiser and try to avoid being destroyed by the aliens. High-speed graphics. ..... LII, 16K Cass. $14.95
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Cylon Raider — By L4 - A battle between you and a Cylon Battle ship. The Cylon twists and turns in its efforts to avoid being hit. ..... LII, 16K Cass. $7.50

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Learning Level II — By Compusoft - Written specifically for your Level II TRS-80*, this book is designed to help the individual learn by himself as well as for classroom. $15.95

The BASIC Handbook — By Compusoft - While not favoring one computer over another, this book explains over 250 BASIC words, how to use them and alternate strategies. $14.95

Z-80 & 8080 Assembly Language Proramming — By Hayden - Giving an introductory look at assembly language for the Z-80 and 8080 processors, it is intended to provide just about everything the applications programmer needs to get the most out of his/her machine. $7.95

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CIRCLE 154 ON READER SERVICE CARD
APRIL 1980

Word Board, cont'd...

Figure 2a

```
WORD BOARD

COPYRIGHT (C) 1979 BY HOWARD BERENBON

ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS
WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS
ENTERING AN '@' WILL SKIP 8 LINES
MAY BE USED AS A HELP TO THE HANDICAPPED

                    I
                    WANT
                    TO
                    EAT

                    THANK YOU

                    IS
                    IT
                    TIME
                    TO
                    GO
```

Program 2

```
0010 PRINT "WORD BOARD"
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0065 PRINT "ENTERING AN '@' WILL SKIP 8 LINES"
0070 PRINT "MAY BE USED AS A HELP TO THE HANDICAPPED"
0100 INPUT A$
0110 IF A$="A" THEN 600
0120 IF A$="B" THEN 640
0130 IF A$="C" THEN 670
0140 IF A$="D" THEN 700
0150 IF A$="E" THEN 730
0160 IF A$="F" THEN 760
0170 IF A$="G" THEN 790
0180 IF A$="H" THEN 810
0190 IF A$="I" THEN 840
0200 IF A$="J" THEN 870
0210 IF A$="K" THEN 910
0220 IF A$="L" THEN 940
0230 IF A$="M" THEN 970
0240 IF A$="N" THEN 1010
0250 IF A$="O" THEN 1040
0260 IF A$="P" THEN 1070
0270 IF A$="Q" THEN 1110
0280 IF A$="R" THEN 1140
0290 IF A$="S" THEN 1170
0300 IF A$="T" THEN 1210
0310 IF A$="U" THEN 1240
0320 IF A$="V" THEN 1270
0330 IF A$="W" THEN 1310
0340 IF A$="X" THEN 1340
0350 IF A$="Y" THEN 1370
0360 IF A$="Z" THEN 1410
0370 IF A$="1" THEN 1440
0380 IF A$="2" THEN 1460
0390 IF A$="3" THEN 1480
0400 IF A$="4" THEN 1500
0410 IF A$="5" THEN 1520
0420 IF A$="6" THEN 1540
0430 IF A$="7" THEN 1560
0440 IF A$="8" THEN 1580
0450 IF A$="9" THEN 1600
0460 IF A$="0" THEN 1620
0470 IF A$="@" THEN 1640
0480 GOTO 100
0600 PRINT TAB(20);"HE"
0610 GOTO 100
0640 PRINT TAB(20);"EAT"
0650 GOTO 100
0670 PRINT TAB(20);"LIKE"
0680 GOTO 100
0700 PRINT TAB(20);"ARE"
0710 GOTO 100
0730 PRINT TAB(20);"IS"
0740 GOTO 100
0760 PRINT TAB(20);"WANT"
0770 GOTO 100
0790 PRINT TAB(20);"DRINK"
0800 GOTO 100
0810 PRINT TAB(20);"SPEAK"
0820 GOTO 100
0840 PRINT TAB(20);"PLEASE"
0850 GOTO 100
0870 PRINT TAB(20);"HAPPY"
0880 GOTO 100
0910 PRINT TAB(20);"THANK YOU"
0920 GOTO 100
0940 PRINT TAB(20);"OKAY"
0950 GOTO 100
0970 PRINT TAB(20);"NOT"
0980 GOTO 100
1010 PRINT TAB(20);"TIME"
1020 GOTO 100
1040 PRINT TAB(20);"YES"
1050 GOTO 100
1070 PRINT TAB(20);"NO"
1080 GOTO 100
1110 PRINT TAB(20);"I"
1120 GOTO 100
1140 PRINT TAB(20);"DO"
1150 GOTO 100
1170 PRINT TAB(20);"YOU"
1180 GOTO 100
1210 PRINT TAB(20);"GO"
1220 GOTO 100
1240 PRINT TAB(20);"HERE"
1250 GOTO 100
1270 PRINT TAB(20);"TO"
1280 GOTO 100
1310 PRINT TAB(20);"IT"
1320 GOTO 100
1340 PRINT TAB(20);"AM"
1350 GOTO 100
1370 PRINT TAB(20);"SLEEP"
1380 GOTO 100
1410 PRINT TAB(20);"SHE"
1420 GOTO 100
1440 PRINT TAB(20);"1"
1450 GOTO 100
1460 PRINT TAB(20);"2"
1470 GOTO 100
1480 PRINT TAB(20);"3"
1490 GOTO 100
1500 PRINT TAB(20);"4"
1510 GOTO 100
1520 PRINT TAB(20);"5"
1530 GOTO 100
1540 PRINT TAB(20);"6"
1550 GOTO 100
1560 PRINT TAB(20);"7"
1570 GOTO 100
1580 PRINT TAB(20);"8"
1590 GOTO 100
1600 PRINT TAB(20);"9"
1610 GOTO 100
1620 PRINT TAB(20);"0"
1630 GOTO 100
1640 FOR I=1 TO 8
1650 PRINT
1660 NEXT I
1670 GOTO 100
```

Let us Take you Elsewhen

We can take you to the 15th century, to the states of Italy to rule the fortunes of many. . . we can take you to 1922 for a solo flight through the American Midwest. . . we can take you to the future, where you'll journey along the final frontier. . . the choice is yours.

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I. The Romulans and the Klingons, normally antagonistic to one another, have decided to form an alliance. This alliance has but one end – to annihilate the United Federation of Planets.

II. You have a dual mission: first, to explore the more distant realms of space; and second, to locate and destroy as many Romulan/Klingon warships as possible. Another ally of the Romulan/Klingon coalition may attack the *Enterprise* – you will receive further instructions.

III. After you make fifty confirmed "kills," your mission will be accomplished, and you can head home.

In Trek-X the vastness of space is depicted by a 12 x 12 x 4 matrix containing suns, planets, moons, and other celestial bodies. Unlike some two-dimensional "treks," Trek-X allows you to move in front of or behind suns, planets, and enemy spacecraft. Note also that quadrant boundaries are transparent to you, just as they would be in real life. You'll have both warp power and sub-light speeds at your disposal, and a detailed map of space will be available on demand. Your ship's computer will display the present alert condition (e.g., Green, Yellow, Red, or CRITICAL), and will keep track of your shield power and the number of hits you've received from enemy vessels.

To add even more realism, optional sound effects – phasor and photon torpedo fire, and their resultant explosions – have been included. Trek-X: more than just a game. For the 8K PET. **Order No. 0032P $7.95.**

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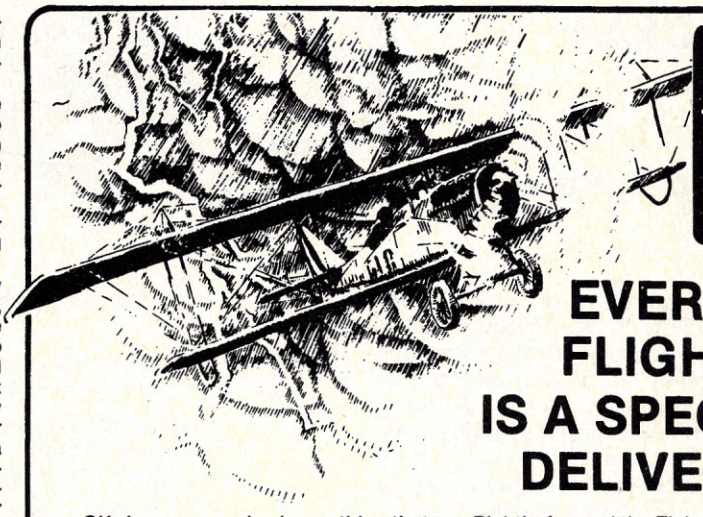

Designed for use on **TRS-80*** 16K LEVEL II

EVERY FLIGHT IS A SPECIAL DELIVERY

OK, Ace, you survived everything that von Richthofen and the Flying Circus threw at you. Well, that was four long years ago – and yesterday's medals don't pay the rent. But just a minute, here's an ad:

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You can almost smell the gasoline as the ground crew fuels your J-4 Jenny biplane to her 26-gallon limit. Precious mail is loaded into the cargo area, tagged for Chicago. The weatherman reports severe icing above 6,000 feet, so you know you have to keep the plane low. It will be a dangerous flight, but you knew that when you took the job. The mail must go through. So, in the tradition of Lindbergh and a hundred unsung heroes, you bravely turn your plane into the wind. The engine roars. Suddenly you're aloft on the first leg of your journey. Dayton's socked in by fog. You change your course for Lucasville. Lightning zigzags the sky. A massive, fast-moving thunderstorm forces you to land in a cornfield. As the weather clears, your plane leaps once more into the sky. But even clear skies can cause problems – violent air currents buffet your fragile wooden aircraft. Your fuel is down to two gallons as Lucasville comes into sight. You make it! Refuel and head for Chicago. But you're not out of trouble yet. There's a wind shear at the Chicago airport. You have to land in a shifting crosswind. Can you make it? AIRMAIL PILOT from INSTANT SOFTWARE. Unlike any other computer simulation you've ever experienced. Challenging. Difficult. But never impossible. An event in a cassette. Crash or fly, it's so realistic, you can almost feel the wind. Requires a Level II 16K. **Order No. 0106R $7.95.**

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The year is A.D. 1400, and you are the ruler of a tiny Italian city-state. You are ambitious by nature and intend to build your little city-state into a powerful kingdom.

So begins Santa Paravia and Fiumaccio, where you and your fellow players compete as rulers of neighboring cities. You control the grain harvest, feed your people, set tax rates, exercise justice, invest in public works and, of course, try to stay on the good side of the church.

Life was short back then, and you'll have only a limited amount of time in which to build your kingdom. The lives of your serfs will depend on your decisions. If you act wisely, then your city-state will grow and you will acquire loftier titles. If your rule is incompetent, your people will starve, and your city-state may be invaded by your neighbors.

You can play the game yourself or set up the tournament version, which allows up to six players at a time to compete. Either way, you're sure to find your route to the throne a challenging and rocky one.

How will you rule your kingdom? Will you be a benevolent ruler – an iron fist in a velvet glove – or will you become unscrupulous and follow the example set by Niccolo Machiavelli in his book on government, *The Prince*? Only *you* can answer that question – with Santa Paravia and Fiumaccio. **Order No. 0043R $7.95.**

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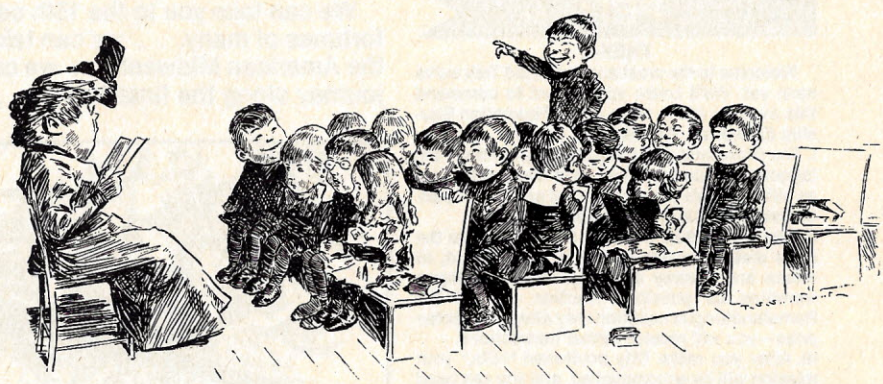
CIRCLE 150 ON READER SERVICE CARD

Another new game from Creative Computing ....

PERQUACKEY



David E. Powers

Perquackey is a word game written in TRS-80 Disk BASIC for a 32K machine. The object of the game is to form as many words as possible from a set of random letters. Scoring depends on the number of letters in the words you form and several other factors which add an extra element of strategy to the game. See the instructions in the program for more details.

Before running the program, you should turn on the display of the realtime clock with the CLOCK command in DOS. Note that the sample runs were done on a Radio Shack line printer using NEWDOS to print the screen display. □

Rabbi David E. Powers, 10 Wilber Ct., New Hyde Park, NY 11040.

```
IS THE CLOCK DISPLAYED? YES_                                    00:06:47


                                                                00:07:22
                    P E R Q U A C K E Y

       D O   Y O U   N E E D   I N S T R U C T I O N S ?

Y E S _

                              PERQUACKEY                        00:07:52

"PERQUACKEY" IS THE DIFFERENT WORD GAME, FUN FOR ALL,
ESPECIALLY THOSE WHO LOVE TO HUNT FOR WORDS AND MEET THE
CHALLENGE OF AN EVER-TICKING CLOCK.

THIS VERSION OF "PERQUACKEY" MAY BE PLAYED BY UP TO
FOUR PLAYERS.  YOU CAN EVEN PLAY IT SOLITAIRE, ALWAYS TRYING TO
BETTER YOUR SCORE FROM PREVIOUS GAMES AND ROUNDS.  THE COMPUTER
WILL SET UP YOUR GAMES, TALLY YOUR SCORES, AND EVEN
MAKE SURE THAT YOU ARE PLAYING FAIRLY.


TO CONTINUE, PRESS ANY KEY.

                                                                00:08:22

THE OBJECT OF THE GAME IS TO FIND AND SPELL AS MANY WORDS AS
POSSIBLE FROM A LIST OF LETTERS THE COMPUTER WILL GENERATE FOR
YOU, ALL IN A THREE-MINUTE TIME LIMIT.  AT FIRST, THE COMPUTER
WILL GIVE YOU TEN LETTERS WITH WHICH TO WORK.  AS YOUR SCORE
INCREASES AND YOU BECOME "VULNERABLE" YOU WILL BE ALLOTTED
THIRTEEN LETTERS.  BUT YOU WILL HAVE TO ACHIEVE BETTER SCORES
OR BE SET POINTS FOR NON-SUPERIOR PLAY!

TO CONTINUE, PRESS ANY KEY.

                                                                00:08:53
THE COMPUTER WILL PROMPT YOU AS YOU GO, IN CASE YOU SHOULD NEED
ANY HELP IN THE MECHANICS OF THE GAME.  BUT FOR YOUR INFORMATION
YOU SHOULD KNOW IN ADVANCE THAT ONLY WORDS IN A STANDARD
DICTIONARY ARE ACCEPTABLE.  ALL THE PLAYERS SHOULD AGREE
ON ONE BEFORE PLAY IS BEGUN.  OF COURSE, LIKE MOST WORD GAMES,
PROPER NAMES, FOREIGN WORDS, ABBREVIATIONS OR CAPITALIZED WORDS
ARE NOT ALLOWED.  ALSO, YOU MUST RESIST THE TEMPTATION TO USE
PUNCTUATION MARKS.  THE COMPUTER WILL NOT ALLOW THEM.  THEY ARE
NOT PART OF THE PERQUACKEY VOCABULARY!


                                                                00:09:21
YOU MAY NOT MAKE A WORD ENDING IN "S" IF THAT WORD ALSO APPEARS
WITHOUT THE "S" DURING THE SAME TURN.

ALL WORDS MUST BE AT LEAST THREE LETTERS LONG.

YOU MAY NOT ENTER MORE THAN FIVE WORDS CONTAINING THE SAME
NUMBER OF LETTERS IN ANY ONE TURN.
TO ENTER A WORD, SIMPLY TYPE IT IN.

OF COURSE, YOUR ERRORS CAN BE RECOVERED.  TO DELETE THE
LAST WORD YOU ENTERED, JUST ENTER ZZ.  TO DELETE ANY OTHER
WORD, TYPE ZZ FOLLOWED, WITHOUT A SPACE, BY THAT WORD (FOR
EXAMPLE, ZZBIGBUG WOULD DELETE THE ENTRY "BIGBUG".
TO CONTINUE, PRESS ANY KEY.

                                                                00:09:53

SCORING IS A LITTLE COMPLICATED, BUT THE COMPUTER HANDLES
IT JUST FINE.  YOU'LL GET ALL THE DETAILS RIGHT AWAY, BUT UP
FRONT YOU SHOULD KNOW ABOUT THE BONUSES, BECAUSE THEY CAN
REALLY ADD UP.


TO CONTINUE, PRESS ANY KEY.

                                                                00:10:23
REMEMBER, YOU COULD ONLY ENTER FIVE WORDS OF EACH LENGTH?
WELL, ONCE YOU DO ENTER FIVE WORDS IN EACH OF TWO ADJOINING
CATEGORIES (FOR EXAMPLE FIVE THREE-LETTER WORDS AND FIVE
FOUR-LETTER WORDS (AHEM!)), YOU GET A RATHER FAT BONUS.

          300 POINTS FOR 5 THREES AND 5 FOURS
          500 POINTS FOR 5 FOURS AND 5 FIVES
          800 POINTS FOR 5 FIVES AND 5 SIXES
         1200 POINTS FOR 5 SIXES AND 5 SEVENS
         1850 POINTS FOR 5 SEVENS AND 5 EIGHTS
         2700 POINTS FOR 5 EIGHTS AND 5 NINES


TO CONTINUE, PRESS ANY KEY

                                                                00:10:59
NOW, HERE'S THE COMPLICATED PART.  SKIP IT IF YOU WISH, BUT IF
YOU BECOME A REAL EXPERT, YOU'LL WANT THIS INFORMATION.  SO HERE
IT IS FOR YOU, ANYWAY.
```

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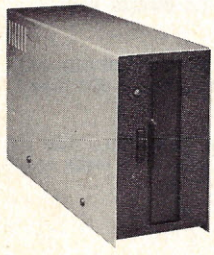

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	Reg.	Our
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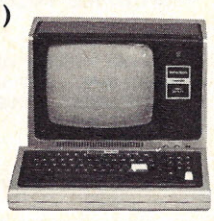
TRS-80* Systems



	Reg.	Our
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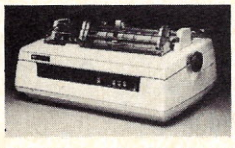
Printers for TRS-80*



	Reg. Price	Our Price
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with Tractor	$2979	$2679
779 Centronics Tractor Feed	$1598	$ 995
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Call for Special Accessory Prices

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ALTOS

Z80 based, dual 8" single-sided double density floppies.

	Reg.	
32K System	$4500	Call for price
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Prices in this ad are for prepaid orders. Slightly higher prices prevail for other-than-prepaid orders, i.e., C.O.D., credit cards, etc.

Freight collect, F.O.B. Charlestown

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	Reg.	Our	Reg.	Our	Reg.	Our
NEWDOS by Apparat†	$ 49	$ 44	$ 55	$ 50		
NEWDOS Plus	$ 99	$ 79	$110	$ 89	$150	$100

	Reg.	Our
CP/M for TRS-80* Model I, Zenith	$150	$145
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Patches and enhances TRSDOS for 40 track and 77 track drives.

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	MODEL I		MODEL II	
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Complete Computer Checkout Program	$ 29	$26		
Spooler by CSA– Prints while doing data entry	$ 29.95	$ 24.95		

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master charge VISA

FOR THE FIRST THREE-LETTER WORD YOU GET 60 POINTS, AND 10 MORE FOR EACH THEREAFTER. 60, 70, 80, 90, 100 POINTS TOTAL FOR 1, 2, 3, 4 OR 5 THREE-LETTER WORDS.

FOR THE FIRST FOUR-LETTER WORD YOU GET 120 POINTS, AND 20 MORE FOR EACH THEREAFTER. 120, 140, 160, 180, 200 POINTS FOR 1, 2, 3, 4 OR 5 FOUR-LETTER WORDS.

TO CONTINUE, PRESS ANY KEY.

00:11:28

AS THE FIVE-LETTER CATEGORY GROWS YOU GET 200, 250, 300, 350 AND 400 POINTS.

SIX LETTER WORDS BRING 300, 400, 500, 600 OR 700 POINTS FOR ONE THROUGH FIVE ENTRIES.

GET SEVEN LETTER WORDS AND YOU'LL WIPE OUT YOUR OPPONENTS. AS THAT CATEGORY FILLS YOU GET 500, 650, 800, 950 AND 1100 POINTS.

BUT LOOK AT THE EIGHTS: 750, 1000, 1250, 1500, 1750 POINTS.

TO CONTINUE, PRESS ANY KEY.

00:11:58

NINE- AND TEN-LETTER WORDS ARE THE SUREST WAY TO DRIVE YOUR OPPONENTS TO DISTRACTION. NINES BRING 1000, 1500, 2000, 2500, OR 3000 POINTS FOR ONE TO FIVE ENTRIES.

AND TENS ? ? ? - - - FORGET THE REST OF THE PLAYERS AND LOOK!

^^^^^ 1500, 3000, 5000, 7500 OR 13000 POINTS
FOR ONE THROUGH FIVE ENTRIES.]]]]]

TO CONTINUE, PRESS ANY KEY.

00:12:33

N O W S O M E V E R Y I M P O R T A N T D E T A I L S

D O N ' T S K I P T H E S E ! !

T O C O N T I N U E , P R E S S A N Y K E Y .

00:13:05

ONCE YOU HAVE ACCUMULATED 2000 POINTS YOU BECOME VULNERABLE! THAT'S FINE, BECAUSE THEN YOU'LL GET 13 LETTERS TO WORK WITH, BUT ALSO YOU MUST SCORE A MINIMUM OF 500 POINTS. IF YOU DON'T SCORE THE MINIMUM, 500 POINTS WILL BE DEDUCTED FROM YOUR SCORE, AND THE POINTS YOU DID MAKE IN THAT ROUND WILL BE DISALLOWED.

WHEN YOU ARE VULNERABLE, YOU MAY NOT MAKE THREE-LETTER WORDS.

THE GAME IS OVER AT THE END OF THE ROUND IN WHICH ANY PLAYER REACHES A TOTAL OF 5000 POINTS.

TO CONTINUE, PRESS ANY KEY.

00:13:33

A WORD ABOUT THE DISPLAY . . .

THE DISPLAY IS SELF-PROMPTING AND WILL HELP YOU A LOT.
IT IS ALSO SELF-EXPLANATORY, LISTING YOUR WORDS BY LENGTH.

WORDS ENTERED AFTER THREE MINUTES WILL AUTOMATICALLY BE DISALLOWED, AND THE TURN WILL BE ENDED. TO END YOUR TURN BEFORE THE TIME LIMIT EXPIRES, ENTER XX.

WHEN YOUR TURN IS ENDED, THE COMPUTER WILL EXAMINE ALL THE ENTRIES AND DISALLOW WORDS MADE BY ADDING S TO OTHER ENTRIES, DUPLICATE ENTRIES AND WORDS INCONSISTENT WITH THE LETTER LIST.

TO CONTINUE, PRESS ANY KEY.

00:14:08

DISALLOWED WORDS WILL BE BRACKETED AS IN THE FOLLOWING EXAMPLES.

WORDS MADE BY ADDING S: ++EXAMPLES++S
DUPLICATE WORDS: ++EXAMPLE++2
WORDS INCONSISTENT WITH LETTERS: ++EXAMPLE++?

TO CONTINUE, PRESS ANY KEY.

00:14:36

AFTER THE COMPUTER DISALLOWS WORDS, YOUR OPPONENTS MAY DO SO, TOO. THEY MAY CHECK WORDS IN A STANDARD DICTIONARY AND THEN ENTER ANY CHALLENGES WHICH THE COMPUTER WILL BRACKET WITH ++ ++C.

AFTER ALL CHALLENGES ARE MADE, ENTER XX, AND THE COMPUTER WILL CALCULATE AND DISPLAY YOUR SCORE AND THEN DISPLAY A SCOREBOARD FOR ALL PLAYERS.

DURING PLAY, THE LOWER RIGHT CORNER OF THE SCREEN WILL SHOW THE PLAYER'S SCORE UP TO THE END OF HIS LAST TURN. THE UPPER RIGHT WILL DISPLAY THE TIMER.

TO CONTINUE, PRESS ANY KEY.

00:15:13

YOU CAN PROBABLY COME UP WITH ALL SORTS OF REFINEMENTS TO THE BASIC GAME. WHAT WONDERFUL DEVELOPMENTS THEY COULD BE! LIKE THEME GAMES. MAYBE DEVOTE ONE WHOLE GAME ONLY TO COMPUTER-SCIENCE WORDS.

OR SCI FI
OR WHO KNOWS
WHERE YOUR
IMAGINATION
WILL LEAD?

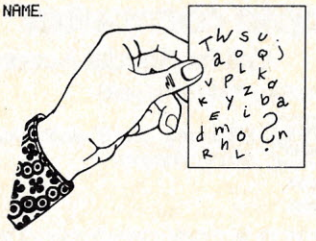
TO CONTINUE, PRESS ANY KEY.

00:16:17

NOW, IF YOU'D LIKE TO REVIEW THAT, JUST KEY AN R.

BUT IF YOU'RE READY TO PLAY, KEY ANYTHING ELSE!.

HOW MANY PLAYERS FOR PERQUACKEY (1-4)? 2 00:17:03
TELL ME PLAYER 1 'S NAME.
==> STEVE
TELL ME PLAYER 2 'S NAME.
==> MR. BILL_



STEVE PLAYING AND NOT VULNERABLE 00:00:02

YOUR LETTERS ARE: P N S B X O K U E A
:3: :4: :5: :6: :7:

:8: :9: :10:

0
STEVE PLAYING AND NOT VULNERABLE 00:02:44

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Q. After "THE CREATOR®" has produced a program, can it be modified?

A. Yes, the resulting program is modular, fully documented and readily accessible for alterations or deletions.

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A. No, the code produced is extremely compact despite complete documentation. If requested **"THE CREATOR®"** will even "pack" or compress information. You may even delete the "remarks" making it even more space efficient.

Q. Must I be expert or even conversant with Basic Language?

A. No, all questions to and answers from the operator require no computer language knowledge, simple every day English will do.

Q. What about math ability?

A. If you can count your fingers and toes, you'll have no problems.

Q. Will the programs which I produce with "THE CREATOR®" be bulky, slow or amateurish?

A. No, the resulting programs will be sophisticated and extremely fast operating. For example, should you create a mailing list or inventory program, the time for any record to be retrieved and displayed from a full disc would take a maximum of 1 second.

Q. Must the programs produced conform to a predetermined format and file length?

A. No, you determine format and file size to fit your requirements. You may have as many as 22 fields or as few as 1.

Q. Can I develop my own business programs?

A. For the most part, yes.

Q. What are the limitations? What programs can I produce with "THE CREATOR®"?

A. Your own ingenuity and hardware limitations.

Q. Will future versions of "THE CREATOR®" make my present copy obsolete?

A. The purchase price includes your original diskette and user instructions. Your program is registered in your name. For a period of one year from the date of purchase you will be entitled to receive FREE any improvements or modifications. The only expense to you will be a new diskette charge (if applicable), packaging and mailing.

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- Can be used with Micro-Soft Basic and CP/M systems.
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- Complete file maintenance including up-date of any record in any field, delete and add new records even with duplicate key.

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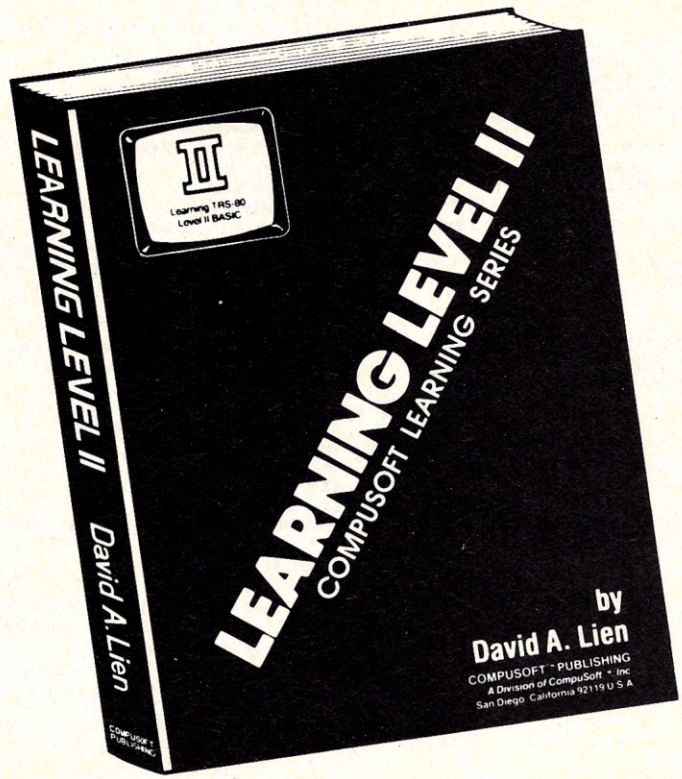
CIRCLE 119 ON READER SERVICE CARD

```
        YOUR LETTERS ARE:  P N S B X O K U E A
    :3:         :4:          :5:          :6:          :7:
    BOX         BASK                      SPOKEN
    POX         BONE
    SUN         PUNK
    PUN         SUNK
                BAKE
       :8:           :9:           :10:

                                                          0
                    * *  OVERTIME  * *                 00:03:34
ENTER CHALLENGES, THEN XX _

        YOUR LETTERS ARE:  P N S B X O K U E A
    :3:         :4:          :5:          :6:          :7:
    BOX         BASK                      SPOKEN
    POX         BONE
    SUN         PUNK
    PUN         SUNK
                BAKE
       :8:           :9:           :10:

                                                          0
                    * *  OVERTIME  * *                 00:04:08
              SCORE FOR STEVE FOR THIS ROUND: 590

        YOUR LETTERS ARE:  P N S B X O K U E A
    :3:         :4:          :5:          :6:          :7:
    BOX         BASK                      SPOKEN
    POX         BONE
    SUN         PUNK
    PUN         SUNK
                BAKE
       :8:           :9:           :10:

                                                          0
                                                       00:04:42
                    TOTAL SCORE, ROUND 1

PLAYER          LAST SCORE      TOTAL SCORE     VULNERABLE?
STEVE              590             590             NO
MR. BILL             0               0             NO

TO CONTINUE, PRESS ANY KEY.
```

```
10 REM *** PERQUACKEY, VERSION 2.2  -- 14 MAY 1979
20 REM *** BASED ON "PERQUACKEY"  (C) HOLLINGSWORTH BROS., 1956
30 REM *** AND ON "PERQUACKEY, THE DIFFERENT WORD GAME"
   (C) LEISURE DYNAMICS, INC., 1970
40 REM *** PUBLISHED BY LAKESIDE INDUSTRIES, A DIVISION OF
   LEISURE DYNAMICS, INC., MINNEAPOLIS, MINN.
50 REM *** PROGRAM BY DAVID E. POWERS
60 REM ***            10 WILBEN CT
70 REM ***            NEW HYDE PARK, NY 11040
80 REM ***            516 437 8320
90 POKE &H40A9,&HFF
100 CLEAR 1000
110 XX$=STRING$(64," ")
120 DEFINT B,E,F,I,L,N,P,R,S,V,W
130 CLS: INPUT "IS THE CLOCK DISPLAYED";A$
140 IF LEFT$(A$,1)="Y" THEN 170
150 PRINT: PRINT "RETURN TO DOS AND ENTER CLOCK COMMAND."
160 CMD"S"
170 CLS
180 PRINT CHR$(23)
190 PRINT @ 274, "PERQUACKEY"
200 PRINT @ 708, "DO YOU NEED INSTRUCTIONS?"
210 PRINT
220 LINEINPUT A$
230 IF LEFT$(A$,1)="N" THEN 940
240 CLS
250 PRINT TAB(28) "PERQUACKEY"
260 PRINT:
    PRINT CHR$(34) "PERQUACKEY" CHR$(34) " IS THE DIFFERENT WORD GAME,
FUN FOR ALL, ESPECIALLY THOSE WHO LOVE TO HUNT FOR WORDS AND MEET THE
CHALLENGE OF AN EVER-TICKING CLOCK."
270 PRINT
280 PRINT "THIS VERSION OF " CHR$(34) "PERQUACKEY" CHR$(34) " MAY BE
PLAYED BY UP TO FOUR PLAYERS.  YOU CAN EVEN PLAY IT SOLITAIRE, ALWAYS TRYING TO
BETTER YOUR SCORE FROM PREVIOUS GAMES AND ROUNDS.  THE COMPUTER"
290 PRINT "WILL SET UP YOUR GAMES, TALLY YOUR SCORES, AND EVEN
MAKE SURE THAT YOU ARE PLAYING FAIRLY."
300 GOSUB 4050
310 PRINT:PRINT"THE OBJECT OF THE GAME IS TO FIND AND SPELL AS MANY WORDS AS
POSSIBLE FROM A LIST OF LETTERS THE COMPUTER WILL GENERATE FOR
YOU, ALL IN A THREE-MINUTE TIME LIMIT.  AT FIRST, THE COMPUTER"
320 PRINT "WILL GIVE YOU TEN LETTERS WITH WHICH TO WORK.  AS YOUR SCORE"
330 PRINT "INCREASES AND YOU BECOME "CHR$(34) "VULNERABLE" CHR$(34) " YOU WILL
BE ALLOTTED THIRTEEN LETTERS.  BUT YOU WILL HAVE TO ACHIEVE BETTER SCORES
OR BE SET POINTS FOR NON-SUPERIOR PLAY!"
340 GOSUB 4050
350 PRINT "THE COMPUTER WILL PROMPT YOU AS YOU GO, IN CASE YOU SHOULD NEED
ANY HELP IN THE MECHANICS OF THE GAME.  BUT FOR YOUR INFORMATION
YOU SHOULD KNOW IN ADVANCE THAT ONLY WORDS IN A STANDARD"
360 PRINT "DICTIONARY ARE ACCEPTABLE.  ALL THE PLAYERS SHOULD AGREE
ON ONE BEFORE PLAY IS BEGUN.  OF COURSE, LIKE MOST WORD GAMES,
PROPER NAMES, FOREIGN WORDS, ABBREVIATIONS OR CAPITALIZED WORDS"
370 PRINT "ARE NOT ALLOWED.  ALSO, YOU MUST RESIST THE TEMPTATION TO USE
PUNCTUATION MARKS.  THE COMPUTER WILL NOT ALLOW THEM.  THEY ARE
NOT PART OF THE PERQUACKEY VOCABULARY!"
380 GOSUB 4050
390 PRINT "YOU MAY NOT MAKE A WORD ENDING IN " CHR$(34) "S" CHR$(34) " IF THAT
WORD ALSO APPEARS WITHOUT THE " CHR$(34) "S" CHR$(34) " DURING THE SAME TURN."
400 PRINT
410 PRINT "ALL WORDS MUST BE AT LEAST THREE LETTERS LONG.
YOU MAY NOT ENTER MORE THAN FIVE WORDS CONTAINING THE SAME
NUMBER OF LETTERS IN ANY ONE TURN.
TO ENTER A WORD, SIMPLY TYPE IT IN.
OF COURSE, YOUR ERRORS CAN BE RECOVERED.  TO DELETE THE"
420 PRINT "LAST WORD YOU ENTERED, JUST ENTER ZZ.  TO DELETE ANY OTHER
WORD, TYPE ZZ FOLLOWED, WITHOUT A SPACE, BY THAT WORD (FOR
EXAMPLE, ZZBIGBUG WOULD DELETE THE ENTRY " CHR$(34) "BIGBUG" CHR$(34)"."
430 GOSUB 4050
440 PRINT
450 PRINT "SCORING IS A LITTLE COMPLICATED, BUT THE COMPUTER HANDLES
IT JUST FINE.  YOU'LL GET ALL THE DETAILS RIGHT AWAY, BUT UP
FRONT YOU SHOULD KNOW ABOUT THE BONUSES, BECAUSE THEY CAN
REALLY ADD UP.
"
460 GOSUB 4050
470 PRINT "REMEMBER, YOU COULD ONLY ENTER FIVE WORDS OF EACH LENGTH?
WELL, ONCE YOU DO ENTER FIVE WORDS IN EACH OF TWO ADJOINING
CATEGORIES (FOR EXAMPLE FIVE THREE-LETTER WORDS AND FIVE"
480 PRINT "FOUR-LETTER WORDS (AHEM!)), YOU GET A RATHER FAT BONUS.

              300 POINTS FOR 5 THREES AND 5 FOURS
              500 POINTS FOR 5 FOURS AND 5 FIVES
              800 POINTS FOR 5 FIVES AND 5 SIXES"
490 PRINT"             1200 POINTS FOR 5 SIXES AND 5 SEVENS
            1850 POINTS FOR 5 SEVENS AND 5 EIGHTS
            2700 POINTS FOR 5 EIGHTS AND 5 NINES"
500 GOSUB 4050
510 PRINT "NOW, HERE'S THE COMPLICATED PART.  SKIP IT IF YOU WISH, BUT IF
YOU BECOME A REAL EXPERT, YOU'LL WANT THIS INFORMATION, SO HERE
IT IS FOR YOU, ANYWAY."
520 PRINT "
FOR THE FIRST THREE-LETTER WORD YOU GET 60 POINTS, AND 10 MORE
FOR EACH THEREAFTER.  60, 70, 80, 90, 100 POINTS TOTAL FOR 1,
2, 3, 4 OR 5 THREE-LETTER WORDS."
530 PRINT "
FOR THE FIRST FOUR-LETTER WORD YOU GET 120 POINTS, AND 20 MORE
FOR EACH THEREAFTER.  120, 140, 160, 180, 200 POINTS FOR 1, 2,
3, 4 OR 5 FOUR-LETTER WORDS."
540 GOSUB 4050
550 PRINT "AS THE FIVE-LETTER CATEGORY GROWS YOU GET 200, 250, 300,
350 AND 400 POINTS."
560 PRINT: PRINT"SIX LETTER WORDS BRING 300, 400, 500, 600 OR 700 POINTS
FOR ONE THROUGH FIVE ENTRIES.
GET SEVEN LETTER WORDS AND YOU'LL WIPE OUT YOUR OPPONENTS.  AS
570 PRINT "THAT CATEGORY FILLS YOU GET 500, 650, 800, 950 AND 1100 POINTS.
BUT LOOK AT THE EIGHTS: 750, 1000, 1250, 1500, 1750 POINTS."
580 GOSUB 4050
590 PRINT "NINE- AND TEN-LETTER WORDS ARE THE SUREST WAY TO DRIVE YOUR
OPPONENTS TO DISTRACTION.  NINES BRING 1000, 1500, 2000, 2500,
OR 3000 POINTS FOR ONE TO FIVE ENTRIES."
600 PRINT: PRINT "AND TENS ? ? ? - - - FORGET THE REST OF THE PLAYERS AND LOOK!"
610 PRINT:PRINT TAB(10) STRING$(5,CHR$(94))" 1500, 3000, 5000, 7500 OR 13000 POINTS"
620 PRINT TAB(15) "FOR ONE THROUGH FIVE ENTRIES."
    STRING$(5,CHR$(93))
630 GOSUB 4050
640 PRINT CHR$(23)
650 PRINT: PRINT"NOW SOME VERY IMPORTANT DETAILS
     DON'T SKIP THESE ! !"
660 XX$=STRING$(32," ")
670 GOSUB 4050
680 XX$=STRING$(64," ")
690 PRINT: PRINT "ONCE YOU HAVE ACCUMULATED 2000 POINTS YOU BECOME VULNERABLE!
THAT'S FINE, BECAUSE THEN YOU'LL GET 13 LETTERS TO WORK WITH,
BUT ALSO YOU MUST SCORE A MINIMUM OF 500 POINTS.  IF YOU DON'T"
700 PRINT "SCORE THE MINIMUM, 500 POINTS WILL BE DEDUCTED FROM YOUR SCORE,
AND THE POINTS YOU DID MAKE IN THAT ROUND WILL BE DISALLOWED."
```

Here's The Second Half . . . . .



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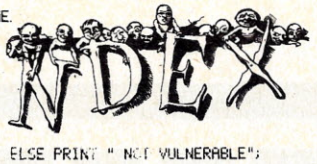
CIRCLE 122 ON READER SERVICE CARD

```
710 PRINT: PRINT "WHEN YOU ARE VULNERABLE, YOU MAY NOT MAKE THREE-LETTER WORDS."
720 PRINT"
THE GAME IS OVER AT THE END OF THE ROUND IN WHICH ANY PLAYER
REACHES A TOTAL OF 5000 POINTS."
730 GOSUB 4050
740 PRINT "A WORD ABOUT THE DISPLAY . . ."
750 PRINT: PRINT"THE DISPLAY IS SELF-PROMPTING AND WILL HELP YOU A LOT.
IT IS ALSO SELF-EXPLANATORY, LISTING YOUR WORDS BY LENGTH.
WORDS ENTERED AFTER THREE MINUTES WILL AUTOMATICALLY BE"
760 PRINT "DISALLOWED, AND THE TURN WILL BE ENDED.  TO END YOUR TURN
BEFORE THE TIME LIMIT EXPIRES, ENTER XX.
WHEN YOUR TURN IS ENDED, THE COMPUTER WILL EXAMINE ALL THE"
770 PRINT"ENTRIES AND DISALLOW WORDS MADE BY ADDING S TO OTHER ENTRIES,
DUPLICATE ENTRIES AND WORDS INCONSISTENT WITH THE LETTER LIST."
780 GOSUB 4050
790 PRINT "DISALLOWED WORDS WILL BE BRACKETED AS IN THE FOLLOWING EXAMPLES."
800 PRINT"
WORDS MADE BY ADDING S:            ++EXAMPLES++S
DUPLICATE WORDS:                   ++EXAMPLE++2
WORDS INCONSISTENT WITH LETTERS: ++EXAMPLE++?"
810 GOSUB 4050
820 PRINT "AFTER THE COMPUTER DISALLOWS WORDS, YOUR OPPONENTS MAY DO SO,
TOO.  THEY MAY CHECK WORDS IN A STANDARD DICTIONARY AND THEN
ENTER ANY CHALLENGES WHICH THE COMPUTER WILL BRACKET WITH
++  ++C."
830 PRINT"
AFTER ALL CHALLENGES ARE MADE, ENTER XX, AND THE COMPUTER WILL
CALCULATE AND DISPLAY YOUR SCORE AND THEN DISPLAY A SCOREBOARD
FOR ALL PLAYERS."
840 PRINT"
DURING PLAY, THE LOWER RIGHT CORNER OF THE SCREEN WILL SHOW THE
PLAYER'S SCORE UP TO THE END OF HIS LAST TURN.  THE UPPER RIGHT
WILL DISPLAY THE TIMER."
850 GOSUB 4050
860 PRINT"YOU CAN PROBABLY COME UP WITH ALL SORTS OF REFINEMENTS TO THE
BASIC GAME.  WHAT WONDERFUL DEVELOPMENTS THEY COULD BE! LIKE
THEME GAMES.  MAYBE DEVOTE ONE WHOLE GAME ONLY TO COMPUTER-
SCIENCE WORDS."
870 PRINT"
OR SCI FI
        OR WHO KNOWS
                    WHERE YOUR
                              IMAGINATION"
880 PRINT "                                                  WILL LEAD?"
890 GOSUB 4050
900 PRINT "NOW, IF YOU'D LIKE TO REVIEW THAT, JUST KEY AN R.
BUT IF YOU'RE READY TO PLAY, KEY ANYTHING ELSE!."
910 A$=INKEY$: IF A$="" THEN 910
920 IF A$="R" THEN 240
930 A$=""
940 RANDOM
950 DEF FNA$(A$)=MID$(A$, RND(6),1)+" "
960 DATA FUNIPT, LTORDN, MUSRIG, BYWOLO, VEJQZX, WOPOMC, BRHIKT,
       SRHIFU, AAAEEE, VSYQWS, FHLPBN, JGDKCM
970 READ C1$, C2$, C3$, C4$, C5$, C6$, C7$, C8$, C9$, VA$, VB$,
      VC$
980 CLS
990 INPUT "HOW MANY PLAYERS FOR PERQUACKEY (1-4)";N
1000 IF N<1 OR N>4 THEN 990
1010 DIM W$(7,5), WT(7), WC(7), WD(7), F(7,5), I$(N), V(N), S(N),      S1(N)
1020 FOR LP=1 TO N
1030   PRINT "TELL ME PLAYER" LP "'S NAME."
1040 LINEINPUT "==> "; I$(LP)
1050 NEXT
1060 P=1
1070 R=1
1080 CLS
1090 PRINT @ 15, I$(P) " PLAYING AND"
1100 IF V(P)=1 THEN PRINT " VULNERABLE"; ELSE PRINT " NOT VULNERABLE";
1110 PRINT @ 1016, S(P);
1120 IF V(P)=1 PRINT @ 323, "NO 3'S"
1130 PRINT @ 261, ":3:";
1140 PRINT @ 272, ":4:";
1150 PRINT @ 283, ":5:";
1160 PRINT @ 296, ":6:";
1170 PRINT @ 309, ":7:";
1180 PRINT @ 648, ":8:";
1190 PRINT @ 663, ":9:";
1200 PRINT @ 679, ":10:";
1210 IF V(P)=0 THEN 1260: REM CHECK FOR VULNERABILITY
1220 V1$=FNA$(VA$)
1230 V2$=FNA$(VB$)
1240 V3$=FNA$(VC$)
1250 LY$=V1$+V2$+V3$
1260 L1$=FNA$(C1$)
1270 L2$=FNA$(C2$)
1280 L3$=FNA$(C3$)
1290 L4$=FNA$(C4$)
1300 L5$=FNA$(C5$)
1310 L6$=FNA$(C6$)
1320 L7$=FNA$(C7$)
1330 L8$=FNA$(C8$)
1340 L9$=FNA$(C9$)
1350 L0$=FNA$(C9$)
1360 LY$=LY$+L1$+L2$+L3$+L4$+L5$+L6$+L7$+L8$+L9$+L0$
1370 PRINT @ 128, "PRESS ANY KEY WHEN READY.";
1380 FOR LP=0 TO 95: A$=INKEY$: IF A$<>"" THEN 1420ELSE NEXT
1390 PRINT @ 128, XX$;
1400 FOR LP=0 TO 50: A$=INKEY$: IF A$<>"" THEN 1420ELSE NEXT
1410 GOTO 1370
1420 PRINT @ 128, XX$;
1430 POKE &H4041,0
1440 POKE &H4042,0
1450 POKE &H4043,0
1460 PRINT @ 202, "YOUR LETTERS ARE:  " LY$;
1470 CMD"R"
1480 PRINT @ 90,"";
1490 LINEINPUT A$
1500 PRINT @ 64, XX$;
1510 IF PEEK(&H4043)>0 OR PEEK(&H4042)>3 OR (PEEK(&H4042)=3
     AND PEEK(&H4041)>0) THEN PRINT @ 0, XX$; ELSE 1540
1520 PRINT @ 22, "* *  OVERTIME  ** *";
1530 GOTO 1760
1540 IF LEFT$(A$,2)="XX" THEN 1760
1550 IF LEFT$(A$,2)="ZZ" AND LEN(A$)=2 THEN 3320
1560 IF LEFT$(A$,2)="ZZ" THEN 3340
1570 A1$=A$
1580 L=LEN(A$)-3
1590 IF V(P)=1 AND L<1 THEN 1480
1600 IF L<0 THEN 1480
1610 IF L>7 THEN L=7
1620 W$(L,WC(L))=A$
1630 WC(L)=WC(L)+1
1640 IF WC(L)>5 THEN PRINT @ 64, "CATEGORY FULL.  DISALLOWED." ELSE GOTO 1670
1650 WC(L)=WC(L)-1
1660 GOTO 1480
1670 B=64*(WC(L)-1)
1680 IF L=0 PRINT @ 325+B,A$;  : GOTO 1480
1690 IF L=1 PRINT @ 335+B,A$;  : GOTO 1480
1700 IF L=2 PRINT @ 346+B,A$;  : GOTO 1480
1710 IF L=3 PRINT @ 358+B,A$;  : GOTO 1480
1720 IF L=4 PRINT @ 371+B,A$;  : GOTO 1480
1730 IF L=5 PRINT @ 709+B%,A$; : GOTO 1480
1740 IF L=6 PRINT @ 724+B,A$;  : GOTO 1480
1750 PRINT @ 740+B,A$;  : GOTO 1480
1760 PRINT @ 64, XX$;
1770 PRINT @ 86, "INSPECTING ENTRIES";
1780 FOR LP=0 TO 7
1790   WT(LP)=WC(LP)
1800   IF WC(LP)>4 THEN WC(LP)=4
1810 NEXT
1820 REM CHECKS FOR WORDS MADE BY ADDING S
1830 PP$="++" : PQ$="++S"
1840 FOR LP=1 TO 7
1850   GOSUB 4030
1860   FOR LQ=0 TO WC(LP)
1870     IF RIGHT$(W$(LP,LQ),1)<>"S" THEN 1930
1880     FOR LR=0 TO WC(LP-1)
1890       IF W$(LP-1,LR)<>LEFT$(W$(LP,LQ),2+LP) THEN 1920
1900       F(LP,LQ)=1
1910       ON LP GOSUB 3860, 3880, 3900, 3920, 3940, 3960,              3980
1920     NEXT LR
1930   NEXT LQ
1940   GOSUB 4040
1950 NEXT LP
1960 REM ELIMINATES WORDS INCONSISTENT WITH LETTER LIST
1970 PP$="++" : PQ$="++?"
1980 FOR LP=0 TO 7
1990   GOSUB 4030
2000 LX$=LY$
2010   FOR LQ=0 TO WC(LP)
2020     IF W$(LP,LQ)="" THEN 2160
2030     IF F(LP,LQ)=1 THEN 2140
2040     LX$=LY$
2050     FOR LR=1 TO LP+3
2060       T$=MID$(W$(LP,LQ),LR,1)
2070       IN=INSTR(LX$,T$)
2080       IF IN=0 THEN 2110
2090       MID$(LX$,IN,1)="."
2100       GOTO 2130
2110       F(LP,LQ)=1
2120       ON LP+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960, 3980
2130     NEXT LR
2140   NEXT LQ
2150   GOSUB 4040
2160 NEXT LP
2170 REM ELIMINATES DUPLICATE ENTRIES
2180 PP$="++" : PQ$="++2"
2190 FOR LP=0 TO 7
2200   GOSUB 4030
2210   FOR LQ=0 TO WC(LP)
2220   IF W$(LP,LQ)="" THEN 2320
2230     FOR LR=0 TO WC(LP)
2240       IF LQ<>LR AND W$(LP,LQ)=W$(LP,LR) THEN 2270
2250     NEXT LR
2260     GOTO 2300
```



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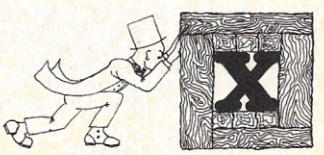
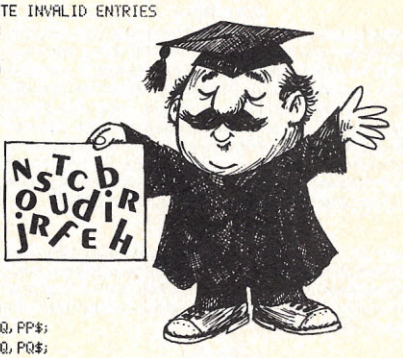
CIRCLE 127 ON READER SERVICE CARD

```
2270     IF F(LP,LQ)=1 THEN 2300
2280      F(LP,LR)=1
2290     ON LP+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940,          3960, 3980
2300   NEXT LQ
2310   GOSUB 4040
2320 NEXT LP
2330 A$=""
2340 REM ELIMINATES CHALLENGED ENTRIES
2350 PP$="++" : PQ$="++C"
2360 A$=""
2370 PRINT @ 64, XX$;
2380 PRINT @ 64, "ENTER CHALLENGES, THEN XX";
2390 PRINT @ 90, "";
2400 LINEINPUT A$
2410 PRINT @ 64, XX$;
2420 PRINT @ 99, "";
2430 IF A$="XX"THEN 2600
2440 IF LEN(A$)<3 THEN 2400
2450 L=LEN(A$)-3
2460 FOR LP=0 TO WC(L)
2470   IF A$=W$(L,LP) THEN 2510
2480 NEXT
2490 PRINT @ 64, "CHALLENGED WORD NOT FOUND              "
2500 GOTO 2390
2510 IF F(L,LP)=1 THEN 2580
2520 F(L,LP)=1
2530 LQ=LP
2540 LP=L
2550 ON L+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960,          3980
2560 PRINT @ 64,XX$;
2570 GOTO 2390
2580 PRINT @ 64, "ENTRY ALREADY DISALLOWED  "
2590 GOTO 2390
2600 PRINT @ 64,XX$;
2610 FOR LP=0 TO 7
2620   WT(LP)=WT(LP)-WD(LP)
2630 NEXT
2640 REM SCORING
2650 IF WT(0)>0 THEN S=50+10*WT(0)
2660 IF WT(1)>0 THEN S=S+100+20*WT(1)
2670 IF WT(2)>0 THEN S=S+150+50*WT(2)
2680 IF WT(3)>0 THEN S=S+200+100*WT(3)
2690 IF WT(4)>0 THEN S=S+350+150*WT(4)
2700 IF WT(5)>0 THEN S=S+500+250*WT(5)
2710 IF WT(6)>0 THEN S=S+500+500*WT(6)
2720 IF WT(7)=1 THEN S=S+1500
2730 IF WT(7)=2 THEN S=S+3000
2740 IF WT(7)=3 THEN S=S+5000
2750 IF WT(7)=4 THEN S=S+7500
2760 IF WT(7)=5 THEN S=S+13000
2770 IF WT(0)=5 AND WT(1)=5 THEN S=S+300
2780 IF WT(1)=5 AND WT(2)=5 THEN S=S+500
2790 IF WT(2)=5 AND WT(3)=5 THEN S=S+800
2800 IF WT(3)=5 AND WT(4)=5 THEN S=S+1200
2810 IF WT(4)=5 AND WT(5)=5 THEN S=S+1850
2820 IF WT(5)=5 AND WT(6)=5 THEN S=S+2700
2830 IF V(P)=1 AND S<500 THEN S=-500
2840 PRINT @ 79, "SCORE FOR " I$(P) " FOR THIS ROUND:" S
2850 S1(P)=S
2860 S(P)=S(P)+S
2870 FOR LP=0 TO 1500 : NEXT
2880 CLS
2890 PRINT
2900 PRINT TAB(20) "TOTAL SCORE, ROUND" R
2910 PRINT
2920 PRINT "PLAYER", "LAST SCORE", "TOTAL SCORE", "VULNERABLE?"
2930 FOR LP=1 TO N
2940   PRINT I$(LP),
2950   PRINT USING "  #####"; S1(LP),
2960   PRINT USING "            #####"; S(LP),
2970   IF S(LP)>=2000 THEN PRINT "          YES" ELSE PRINT "               NO"
2980   IF S(LP)>=2000 THEN V(LP)=1 ELSE V(LP)=0
2990   IF S(LP)>=5000 THEN E=1
3000 NEXT
3010 PRINT : PRINT : PRINT
3020 IF E=1 AND P<N PRINT "GAME OVER AT CONCLUSION OF THIS ROUND"
3030 IF E=1 AND P=N THEN 3250
3040 P=P+1
3050 IF P=N+1 THEN R=R+1
3060 IF P=N+1 THEN P=1
3070 GOSUB 4050
3080 PRINT "STAND BY, PLEASE.";
3090 FOR LP=0 TO 7
3100   WT(LP)=0
3110   WC(LP)=0
3120   WD(LP)=0
3130   FOR LQ=0 TO 4
3140     W$(LP,LQ)=""
3150     F(LP,LQ)=0
3160 NEXT LQ, LP
3170 LX$=""
3180 LY$=""
3190 S=0
3200 W0$=""
3210 X1$=""
3220 S1=0
3230 A1$=""
3240 GOTO 1080
3250 PRINT "GAME NOW OVER"
3260 PRINT "TO PLAY AGAIN KEY A."
3270 Z$=INKEY$
3280 IF Z$="" THEN 3270
3290 IF Z$="A" THEN RUN
3300 END
3310 REM ROUTINE TO DELETE ENTRIES BY PLAYER
3320 A$=A1$
3330 GOTO 3350
3340 A$=RIGHT$(A$,LEN(A$)-2)
3350 PRINT @ 69, "DELETING "A$"              "
3360 IF LEN(A$)<3 THEN 3430
3370 X1$=STRING$(LEN(A$)," ")
3380 L=LEN(A$)-3
3390 IF L>7 L=7
3400 FOR LP=0 TO WC(L)-1
3410  IF A$=W$(L,LP) THEN 3450
3420 NEXT
3430 PRINT @ 90, "              NOT FOUND";
3440 GOTO 1480
3450 W$(L,LP)=""
3460 W$(L,LP)=W$(L,WC(L)-1)
3470 W$(L,WC(L)-1)=""
3480 W0$=W$(L,LP)
3490 ON L+1 GOTO 3500, 3540, 3580, 3620, 3660, 3700,          3740, 3780
3500 PRINT @ 325+64*LP,X1$;
3510 PRINT @ 325+64*LP,W0$;
3520 PRINT @ 325+64*(WC(L)-1),X1$;
3530 GOTO 3810
3540 PRINT @ 335+64*LP,X1$;
3550 PRINT @ 335+64*LP,W0$;
3560 PRINT @ 335+64*(WC(L)-1),X1$;
3570 GOTO 3810
3580 PRINT @ 346+64*LP,X1$;
3590 PRINT @ 346+64*LP,W0$;
3600 PRINT @ 346+64*(WC(L)-1),X1$;
3610 GOTO 3810
3620 PRINT @ 358+64*LP,X1$;
3630 PRINT @ 358+64*LP,W0$;
3640 PRINT @ 358+64*(WC(L)-1),X1$;
3650 GOTO 3810
3660 PRINT @ 371+64*LP,X1$;
3670 PRINT @ 371+64*LP,W0$;
3680 PRINT @ 371+64*(WC(L)-1),X1$;
3690 GOTO 3810
3700 PRINT @ 709+64*LP,X1$;
3710 PRINT @ 709+64*LP,W0$;
3720 PRINT @ 709+64*(WC(L)-1),X1$;
3730 GOTO 3810
3740 PRINT @ 724+64*LP,X1$;
3750 PRINT @ 724+64*LP,W0$;
3760 PRINT @ 724+64*(WC(L)-1),X1$;
3770 GOTO 3810
3780 PRINT @ 740+64*LP,X1$;
3790 PRINT @ 740+64*LP,W0$;
3800 PRINT @ 740+64*(WC(L)-1),STRING$(LEN(W0$)," ");
3810 WC(L)=WC(L)-1
3820 GOTO 1480
3830 REM S/R TO DELETE INVALID ENTRIES
3840 PP=323 : PQ=328
3850 GOTO 3990
3860 PP=333 : PQ=339
3870 GOTO 3990
3880 PP=344 : PQ=351
3890 GOTO 3990
3900 PP=356 : PQ=364
3910 GOTO 3990
3920 PP=369 : PQ=378
3930 GOTO 3990
3940 PP=707 : PQ=717
3950 GOTO 3990
3960 PP=722 : PQ=733
3970 GOTO 3990
3980 PP=738 : PQ=750
3990 PRINT @ PP+64*LQ,PP$;
4000 PRINT @ PQ+64*LQ,PQ$;
4010 WD(LP)=WD(LP)+1
4020 RETURN
4030 PRINT @ 108, CHR$(143); RETURN
4040 PRINT @ 108, " "; RETURN
4050 PRINT @ 896, "TO CONTINUE, PRESS ANY KEY.";
4060 FOR LP=0 TO 75: AA$=INKEY$: IF AA$<>"" THEN 4100ELSE NEXT
4070 PRINT @ 896, XX$;
4080 FOR LP=0 TO 50: AA$=INKEY$: IF AA$<>"" THEN 4100ELSE NEXT
4090 GOTO 4050
4100 CLS
4110 PRINT
4120 RETURN
```





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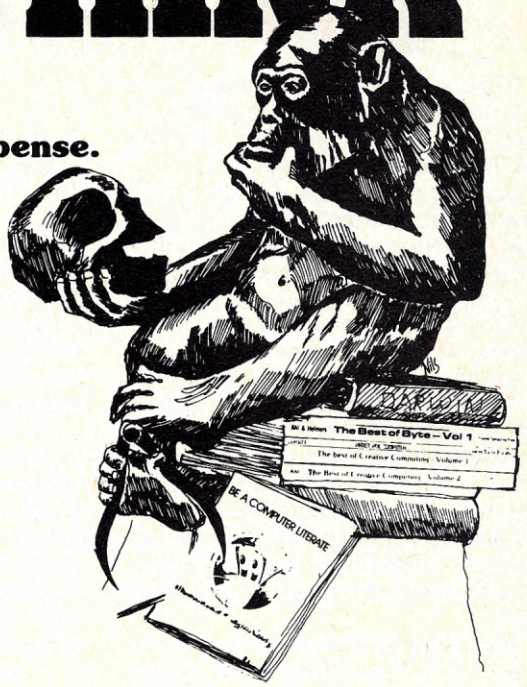
THINK



Strategy Games - 1 keeps games players in suspense.

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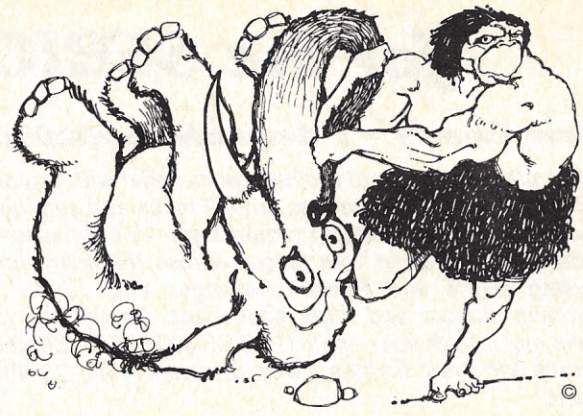
Bilingual Original Adventure



Betsy Staples

"You are standing at the end of a road before a small brick building. A small stream flows out of the building and down a gully."

So begins Bilingual Adventure, Creative Computing's version of Original Adventure. For those familiar with the Adventure series of games, the first move is obvious. For the benefit of those who have never played, however, a brief explanation is in order.

The object of the game is to find and escape with as many treasures as possible. Each move presents the player with a new situation, which may include a new treasure or peril, and always requires that a decision be made—even if it is only the choice of direction to be taken on the next move.

But, back to the beginning of the game: the first thing the player would want to do is have a look around inside the building, so he or she types a one or two word command and waits to see if the computer responds. If it does not, he must keep trying until he finds words which are included in the vocabulary of the program.

Entering a building is trivial, of course, but killing a dwarf may require some more taxing mental gymnastics. The game itself is quite absorbing and challenging even for one who has never been much of a game player.

Ancelme Roichel has added a new twist to the Creative Computing version of Original Adventure. The game, which is written in the Sam 76 language, may be played in either English or French.

When I first heard about this version of Adventure my reaction was one of enthusiasm on behalf of French speaking computer buffs. But I was skeptical about its value as a tool for foreign language teaching. It was with that attitude that I sat down to try the game for myself.

I played for a little while in English until I became accustomed to the logic and procedures required in the game. Each proper command is met with an acknowleging phrase: "Roger," "OK," or "Done." If the player types in an incorrect or incomplete command, the program responds by repeating the command followed by "what?" ("Open what?") This is amusing the first time or two, but soon becomes tiresome, particularly since nothing that is typed in response is ever accepted.

It was not until I encountered "a vicious looking green snake" that I became curious about the French translation. I typed "French," waited about 15 seconds for the French description of my current location to appear on the screen, and discovered that the snake was an *affreux serpent.*

I also discovered to my surprise that my rusty French was adequate for deciphering most of the descriptions of the snake's surroundings. I was not, however, up to doing away with the snake *en Francais*, so I returned to English long enough to discover that "for ecological reasons, snakes can't be killed here."

Very shortly thereafter I became hopelessly lost in a maze and had to give up. I started over and decided to try the whole thing in French. Outside of the fact that I never could get out of the brick building, I found the experiment very rewarding.

As I went from one situation to another, I remembered the general descriptions and was able either to guess or remember the meanings of most of the French words. The real challenge was remembering enough vocabulary to give the appropriate commands

I had, for example a very difficult time putting down the treasures I was carrying. I tried *"rester," "mettre," "laisser," "deposer,"* and several other verbs that my dictionary suggested. None worked. I switched to English.

On the other hand, once I had come up with the proper infinitive form of the verb, I found that Adventure was not fussy about the conjugation thereof. It would respond to the first person singular *(je prends)* as well as the second person plural *(prenez)* or the infinitive *(prendre).*

Is it a good way to learn French? Probably not if one is starting from scratch. As a vehicle for practicing the language, however, it seems superb.

Obviously, the student is limited by the vocabulary used in the game, but that is sizable and far from elementary. Much more important is the mental exercise the player gets trying to think of alternate ways to express the same thought. If "put out lamp" fails, for example, he can try "unlight lamp" or "extinguish lamp."

This ability to re-cast a sentence or thought in words and constructions that are familiar is one of the keys to successful foreign language learning. This is a skill that gets a workout even when the game is played in English, and the French version provides even better practice.

When I mentioned Adventure to a member of our editorial staff, he expressed impatience with the procedure of trying to guess the vocabulary recognized by the program. He would prefer, he said, a menu or listing of the vocabulary available. This approach, I believe, would eliminate some of the fun and a large part of the educational value of the game. When speaking to someone in a foreign country, it is frequently necessary to rephrase one's question or idea several times before the other person understands.

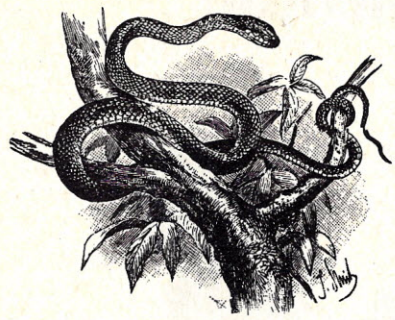
One of the most difficult aspects of foreign language teaching is motivating students to learn. There is, after all, a limit to the amount of excitement that can be generated using a 500-word vocabulary, and each addition to the list seems to require a painful round of drills and quizzes.

Bilingual, cont'd...

After only a brief sojourn in the subterranean world of Bilingual Adventure, I had increased my French vocabulary by eight or ten words (including *affreux),* so I am sure that a persistent student with access to the game over a long period of time could learn quite a bit. There is nothing like being threatened by a knife-wielding dwarf to inspire you either to recall or discover the word for "kill"!

Motivation is desirable, but frustration is not, and not being able to understand or extricate oneself from a situation in a foreign language could be frustrating. This is not a problem with Bilingual Adventure. The ability to change from one language to the other makes it possible to bridge a gap in vocabulary and continue with the adventure. (As I mentioned above, even with the help of a dictionary, I never did discover the French command that would allow me to leave the brick house.)

Since the transition is not accomplished instantaneously, the player is not tempted to switch back and forth frequently. It is much quicker to



consult a dictionary than it is to shift to English and then back to French to find the meaning of a word. However, if the whole description is unclear, or all attempts to find an acceptable command have failed, it is very comforting to know that a translation is only 15 seconds away.

The instruction sheet that comes with the disk warns that the material is "PG Rated," and suggests some steps to take "if bawdy material of an erotic nature offends you or your controller." However, in over 12 hours of play, I failed to notice anything that could be considered offensive—with the possible exception of the dispatch of numerous dwarves, which might offend those who are bothered by violence.

The instruction sheet also provides directions for saving a game: " 'preserve' allows you to save the game as it stands and continue later." Unfortunately, it does not tell how to recall the game after it has been saved.

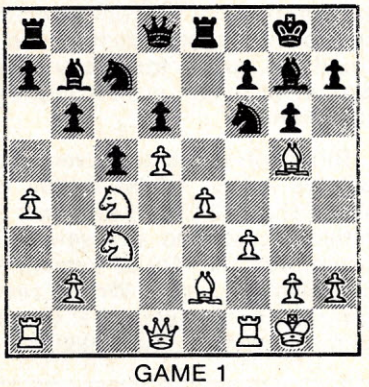
With the exception, then, of the few annoyances I have mentioned—most of which do no more than slow the game—my evaluation of Bilingual Adventure is positive. I think it can be used very effectively in a classroom or tutorial situation for practice and reinforcement of vocabulary and reading skills. And if you get tired of self-improvement, you can always just play it for fun—it should be good for many, many hours of diversion even if you don't know French. □

Bilingual Original Adventure is available on 8" CP/M floppy disk (CS-9004) for $24.95. It runs in a 32K system or, to use the save game feature, 48K. A TRS-80 version will be available in June. Write Creative Computing Software, P.O. Box 789-M, Morristown, NJ 07960.

The 1980 North American Computer Chess Championship

This event is the Indy 500 of the computer industry.
Theodore H. Ehara

CHESS 4.9 from Northwestern University, won the North American Computer Chess Championship (NACCC) after drawing BELLE from Bell Laboratories, in the last round battle (see Figure 1). BELLE, who was defending champion, had drawn earlier with CHAOS in the second round of the tournament. This gave BELLE a final score of three against CHESS 4.9's score of three and a half, out of four possible points.



GAME 1
CHESS 4.9 - BELLE

1.	P-Q4, N-KB3	33.	B-N3, R-R5
2.	P-QB4, P-B4	34.	Q-B1, B-B1
3.	P-Q5, P-K3	35.	R-Q2, Q-Q1
4.	N-QB3, P×P	36.	Q-B1, P-R4
5.	P×P, P-Q3	37.	K-N1, P-R5
6.	P-K4, P-KN3	38.	B-B2, B-N2
7.	N-KB3, B-N2	39.	N-K3, B×B
8.	B-K2, O-O	40.	Q×B, R-R8+
9.	O-O, R-K1	41.	R-Q1, R-R7
10.	N-Q2, N-R3	42.	Q-Q3, R×P
11.	P-B3, N-B2	43.	N-B4, R-QB7
12.	P-QR4, P-QN3	44.	P-K5, B×P
13.	N-QB4, B-QR3	45.	N×B, P×N
14.	B-Kn5, P-R3	46.	Q×QNP, R-K7
15.	B-R4, P-KN4	47.	K-B1, P-B5
16.	B-B2, N-R4	48.	Q-N7, R-R7
17.	N-K3, B-B1	49.	B-N6, P-R6
18.	Q-B2, N-B5	50.	Q×N, Q-B3
19.	B-B4, B-Q2	51.	Q-Q8+, Q×Q
20.	KR-Q1, Q-B3	52.	B×Q, R×P
21.	B-N3, N-R4	53.	R-K1, P-B6
22.	B-K1, N-B5	54.	R×P, P-B7
23.	K-R1, P-R3	55.	R-K8+, K-N7
24.	B-N3, P-N4	56.	B×P, R×B
25.	P×P, P×P	57.	R-QB8, R-N7
26.	R×R, R×R	58.	P-Q6, R×P
27.	B-B1, P-QN5	59.	P-Q7, R-Q7
28.	N-K2, P-N6	60.	K-N1, R×P
29.	Q-N1, N-R4	61.	R×P, R-Q3
30.	B-B2, N-B5	62.	R-B2, K-B3
31.	N-B4, N×N	63.	K-R2, draw
32.	B×N, B-N4		

FIGURE 1

A highlight of this tournament was an exhibition game given by CHESS 4.9. In response to a theoretical argument as to whether a strong chess player could defeat a weaker player who was aided by a strong program, CHESS 4.9 and its programmer, David Slate (expert) played David Levy (International Master). Playing the Bird's Opening, Slate and CHESS 4.9 lost the game after fifty moves (see Figure 2).

This event, which is held by the American Computing Machinery in their annual convention, has been compared to the Indy 500 for the computer industry. While the same

Left to Right: Joe Condon, David Slate, Larry Atkin and Ken Thompson in the Chess 4.9 - BELLE game. Joe Condon and David Slate study the position, while Larry Atkin and Ken Thompson await BELLE's reply.

Crosstable of the North American Computer Chess Championship

Crosstable of the North American Computer Chess Championship

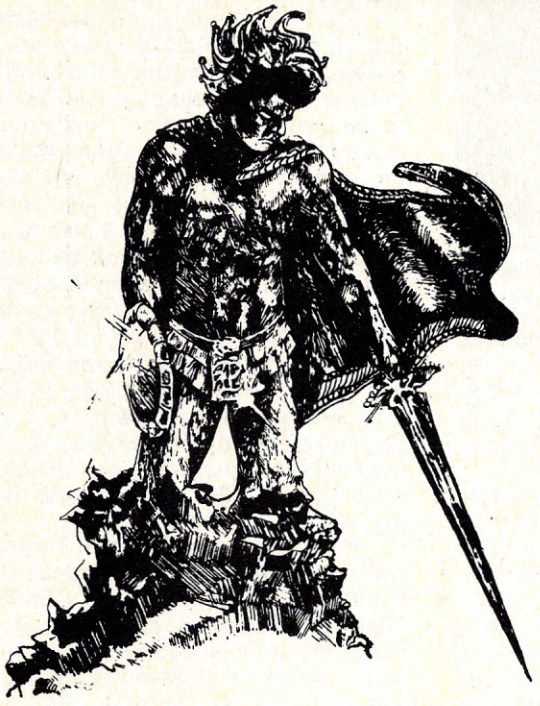
Program	rate	perf	1	2	3	4	total
1 CHESS 4.9	2040	2099	8W	9W	3W	2D	3+
2 BELLE	1950	1982	5W	4D	7W	1D	3
3 DUCHESS	1889	1942	10W	7W	1L	4W	3
4 CHAOS	1775	1794	12W	2D	9W	3L	2+
5 L'EXCENTRIQUE	0	1640	2L	12W	8W	6D	2+
6 MYCHESS	0	1552	7L	10W	11W	5D	2+
7 SARGON 3	0	1614	6W	3L	2L	9D	1+
8 OSTRICH 80	1450	1374	1L	11W	5L	10D	1+
9 BLITZ 6.9	0	1516	11W	1L	4L	7D	1+
10 AWIT	1325	1314	3L	6L	12W	8D	1+
11 BS '66 '76	0	1045	9L	8L	6L	12W	1
12 RUFUS	0	644	4L	5L	10L	11L	0

Example of how to read this crosstable:
L'EXCENTRIQUE wasn't rated before this tournament, but had a performance, in the tournament, of 1640. It lost its first round game against BELLE, then won its next two games against RUFUS and OSTRICH 80. In the final round it drew its game with MYCHESS, for a final result of 2+ (2.5). A win counts as a point, a draw counts as half a point.

TABLE 1

Theodore H. Ehara, 1004 Hinman Ave., Evanston, IL 60202.

A New Type of Game



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The original computer version of Adventure was written by Willie Crowther and Don Woods in Fortran on a PDP-10 at MIT. In this version the player starts near a small wellhouse. Upon entering the house, he finds food, water, a set of keys and a lamp. Armed with only these items, he must set out to explore the countryside in search of treasure and other objects of play. He must also confront dwarfs, snakes, trolls, bears, dragons, birds, and other creatures during his quest. The game accepts one-or two-word commands such as GET LAMP* SOUTH* or KILL DWARF. Of course, if you don't have the proper tool to carry out an action, or if you do something foolish, you may find yourself in big trouble.

In playing the game you wander thru various 'rooms' (locations), manipulating the objects there to try to find 'treasures'. You may have to defeat an exotic wild animal to get one treasure, or figure out how to get another treasure out of a quicksand bog. You communicate thru two-word commands such as 'go west', 'climb tree', 'throw axe', 'look around'.

Adventure

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PIRATE ADVENTURE (by Scott Adams) - "Yo Ho Ho and a bottle of rum..." You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island. Can you recover LONG JOHN SILVER's lost treasures? Happy sailing matey.....

MISSION IMPOSSIBLE ADVENTURE (by Scott Adams) - Good Morning, Your mission is to... and so it starts. Will you be able to complete your mission in time? Or is the world's first automated nuclear reactor doomed? This one's well named, its hard, there is no magic but plenty of **suspense**. Good luck.....

THE COUNT (by Scott Adams) - You wake up in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here, and WHY did the postman deliver a bottle of blood? You'll love this Adventure, in fact, you might say it's LOVE AT FIRST BITE.....

ADVENTURELAND (by Scott Adams) - You wander through an enchanted world trying to recover the 13 lost treasures. You'll encounter WILD ANIMALS, MAGICAL BEINGS, and many other perils and puzzles. Can you rescue the BLUE OX from the quicksand? Or find your way out of the maze of pits? Happy Adventuring.....

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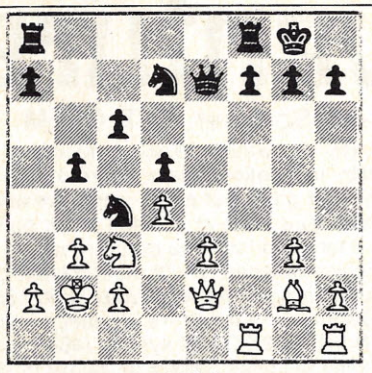
Championship, cont'd...

elements of man and machine exist in both events, the battle of ideas seems to overflow in the NACCC. Not only have programmers taken different approaches to their use of hardware and programming, but their research in improving the chess playing program strikes at the very core of problems facing the developers of artificial intelligence.

A good example of the diversity of thought at the NACCC is shown through the answers given by two programmers in separate interviews. Answering similar questions, David Kittinger and Ken Thompson display their personal understanding of "where we are" and "where we should go" to improve the electronic chess player.

Ken Thompson, along with Joe Condon, has developed and refined BELLE for the last ten years. It is run on a PDP 11/70 with a special move generation hardware (100 K words; 16 bits; 800,000 inst/sec). BELLE plays about expert level and is written in C and assembly language. It requires 16K for the program and 1K for the tree search. BELLE has a book of 200,000 opening positions, along with special end-game databases that are also incorporated into the program.



GAME 2
CHESS 4.9 + Slate vs. Levy

1.	P-KB4,	P-Q4	
2.	N-KB3,	N-KB3	
3.	P-K3,	B-N5	
4.	P-QN3,	QN-Q2	
5.	B-N2,	P-QB3	
6.	B-K2,	B×N	
7.	B×B,	Q-B2	
8.	N-B3,	P-K4	
9.	P×P,	N×P	
10.	Q-K2,	B-Q3	
11.	P-N3,	Q-K2	
12.	O-O-O,	O-O	
13.	B-N2,	B-R6	
14.	K-N1,	B×B	
15.	K×B,	P-QN4	
16.	QR-KB1,	KN-Q2	
17.	P-Q4,	N-B5+	
18.	P×N,	Q-N5+	
19.	K-B1,	Q×N	
20.	P×NP,	P×P	
21.	B×P,	N-N3	
22.	B-N3,	N-B5	
23.	B×N,	P×B	
24.	Q-K1,	Q-R6+	
25.	K-Q2,	QR-N1	
26.	K-K2,	R-N7	
27.	Q-Q2,	R×RP	
28.	R-QN1,	Q-K2	
29.	R-R1,	Q-K5	
30.	KR-QB1,	R×R	
31.	R×R,	Q-N7+	
32.	K-Q1,	Q-R8+	
33.	Q-K1,	Q-N2	
34.	K-K2,	R-N1	
35.	R-R4,	R-B1	
36.	R-R5,	Q-K5	
37.	R×P,	Q×BP+	
38.	Q-Q2,	Q-K5	
39.	Q-K1,	P-B6	
40.	K-B2,	P-R4	
41.	R-R5,	P-R5	
42.	R-R1,	P-R6	
43.	Q-R1,	Q-B7+	
44.	K-B3,	R-B3	
45.	Q-QN1,	R-B3+	
46.	K-N4,	Q-K2+	
47.	K-R4,	R-R3+	
48.	K-N5,	Q-R4+	
49.	K-B4,	R-B3+	
50.	K-K4,	Q-B4 mate	

FIGURE 2

David Levy points to a demonstration board and comments to the audience while the programmers await their machines' move.

Participating in its first ACM tournament, David Kittinger took MYCHESS to the Paul Masson tournament and in unofficial competition achieved a performance of a "C" player. MYCHESS runs on a Cromeco Z-2D (64K; 8 bits; 600,000 inst/sec) and was one of three micro-computers in the field of twelve contestants. The program is written in Z-80 assembly language and requires 19K bytes. MYCHESS has a small book of 3,000 opening positions and searches 9,000 positions in every move.

CC: Do you, yourself play chess?

DK: Yes. I'm about a 1900 (class A) rated player, which helps.

KT: No . . . (being a chess player) wouldn't help or hinder programming a chess program. It would be just a waste of time.

CC: What do you think of the micro-computers, compared to the big machines?

DK: These micros, you're talking about a 1/2000 or so computing speed and yet their level of skill is certainly higher than 1/2000. They play a very capable game.

KT: I don't think micros are fast enough to compete. Right now the name of the game is horsepower. Micros just have to get a lot faster before they compete well, or some programming revelation will have to occur that I don't foresee.

CC: What are your thoughts about the evaluator function (evaluating positional advantages) in micros?

KT: It doesn't buy it. They'll (micros) lose the game. You know you'll have a very, very pretty position and the other opponent will cut your throat. It only takes one mistake to lose — totally. You can build up a good position, but at some point you've got to win and while you're building up, you can't lose. There are a lot of moves in tactics that will lose a game instantly. Look at SARGON (talking about the recent SARGON-BELLE game, see Figure 3). They had a totally won game and made one move that was overwhelmed by tactics.

DT: (Discussing the SARGON-BELLE game) SARGON came close to winning it, indicating that a direction to pursue in these chess computer games is the evaluator function. That's overlooked. Between their program and my program, I think we have the best evaluator tied in with a full width search of any program. 4.9 also has a good evaluator, I understand, although they cut a lot of it out, going for speed, because they think extra plys means better chess — maybe they're right — SARGON should have beaten BELLE last night. It came very close. In fact they had a draw by repetition in the bag, but because SARGON was even it tried to avoid the draw. But it had a draw against BELLE, which won this tournament last year.

It must be noted that Ken Thompson intends to improve his hardware by building a parallel machine. ("Something the size of a suitcase.") This machine should speed BELLE up by a factor of 100. Thompson estimates it will add 2-3 plys more to BELLE's search and added, "That's a jump in hardware of about twenty years." He hopes to complete the machine for the 1981 NACCC.

Levy discussing his game with the audience following its completion.

BELLE also has a micro-version, run an a LSI-11. Unlike SARGON or MYCHESS, Thompson is not selling the program commercially. This little BELLE had beaten an earlier version of SARGON. When asked if Thompson had ever thought of entering the little BELLE into a micro-tournament, his reply was short and to the point. "No. It's much too strong."

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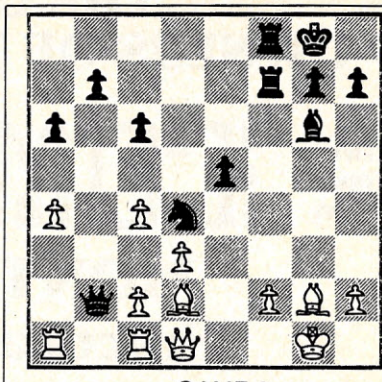
Championship, cont'd...



GAME 3
SARGON 3 - BELLE

1. N-QB3, P-Q4	35. B-Q2, Q-N7
2. P-K4, N-KB3	36. QR-N1, Q-R7
3. P×P, N×P	37. R-R1, Q-N7
4. N×N, Q×N	38. B-K3, R-K2
5. N-K2, N-B3	39. QR-N1, Q-R6
6. P-Q3, P-K4	40. R-R1, Q-B6
7. N-B3, B-QN5	41. B-Q2, Q-N7
8. B-Q2, B×N	42. QR-N1, Q-R7
9. P×B, B-B4	43. B-N4, KR-B2
10. P-QB4, Q-Q5	44. R-R1, Q-N7
11. B-K3, Q-B3+	45. QR-N1, Q-R7
12. B-Q2, Q-R6	46. B×R, R×B
13. P-N4, B-Q2	47. R-R1, Q-N7
14. B-N2, O-O	48. K-B1, R-KB2
15. O-O, P-B4	49. QR-N1, Q-R7
16. Q-N1, QR-N1	50. Q-K1, N×P
17. P×P, B×P	51. Q×P, B×P+
18. Q-N5, P-QR3	52. K-N1, Q-R6
19. Q-Q5+, R-B2	53. Q-N8+, R-B1
20. KR-N1, R-Q8	54. Q×P, N-Q5
21. Q-B3, N-Q5	55. R-R1, Q-B4
22. Q-Q1, P-B3	56. R-Q1, B×P
23. B-N5, QR-KB1	57. K-N1, B-Q4
24. B-K3, Q-B6	58. B×B, Q×B+
25. R-B1, Q-N2	59. K-N1, N-K7+
26. P-QR4, B-N3	60. K-B1, Q-B6
27. QR-N1, Q-R3	61. K-K1, Q×P
28. R-R1, Q-B6	62. K-Q2, R-Q1+
29. B-Q2, Q-N7	63. K-B2, N-Q5+
30. QR-N1, Q-R7	64. K-Q3, N-N4+
31. QR-Q-N7	65. Q-Q7, R×Q+
32. B-K3, K-R1	66. K-B4, Q-B7+
33. QR-N1, Q-R3	67. K-N4,
34. R-R1, Q-B6	Q-B3 mate

FIGURE 3

When asked if CHESS 4.9 would pursue advances in speed along with BELLE, David Slate replied, "No. We really aren't into the hardware business." In addition, the most interesting member of the Northwestern team didn't show up at the tournament — CHESS 5.0. CHESS 5.0 is a complete rewrite of the program. It wasn't entered in the 1980 NACCC because they were still getting the bugs out of it. Instead of assembly language, CHESS 5.0 is written in Fortran. According to Slate, it is playing master-level chess.

If all these different ways of improving chess programs seem confusing, things might clear up a little, probably after the 1981 North American Computer Chess Championship.

Interview with Gordon Bell

At Brown University Symposium (L to R) Kent Curtis (NSF), Gordon Bell (DEC), Peter Denning (Purdue Univ.)

David Ahl

Dr. Gordon Bell is Vice Presider. of Engineering of Digital Equipment Corporation, the world's largest manufacturer of minicomputers. He was previously a Professor of Computer Science at Carnegie-Mellon University. Publisher David Ahl, an alumnus of both Carnegie-Mellon and DEC, talked to Gordon following his presentation at Brown University. Here are some excerpts from their conversation.

Dave: In contrast to some people in the educational community, you seem to feel that computer research can be done at places other than universities and posed a couple of alternatives giving the Japanese example; do you think you could get any agreement on that? Also, where should it be done?

Gordon: Need certainly plays a big part. Research is sometimes done by accident and sometimes with planning. In the meantime, one recognizes that, essentially, a flow of ideas is needed to make a product. But we sometimes have problems and we don't see immediate solutions and one can't be developed; we do research based on meaning.

Dave: For example, do you think the Japanese system, where government doesn't fund any kind of research except by pumping money into companies, works better?

Gordon: They find out about a lot of research through the industry and industry puts the money back in, but I don't know whether they control on that basis. I would certainly like some similar controls because that would solve the basic problem of flow. If you've got ideas the biggest problem is how to develop and research them. Getting it to move out of this environment is virtually impossible. An idea may sit there for years. They sit there and will never be resolved. I really believe in a healthy buyer-seller relationship. There are people who have some research needs and so people do that because there is a need.

Dave: Which generally doesn't exist in the university?

Gordon: Certainly NSF is not oriented that way; you are writing for a group of peers. It has no other purpose than to have a by-product with which to educate the faculty so they can teach and to generally get some more knowledge in the field, which is fine. It's a self perpetuating community.

Dave: You also said that you didn't feel we need any more language compilers or typesetting systems but gave a couple of examples of business and the arts being more productive areas for new applications. Specifically, what do you think are areas where young people can concentrate and have some expectation of payoff if they want to do something interesting in computer science. Should it be done through a company or should they work on their own with a microcomputer. Where are the greatest opportunities for significant achievement?

Gordon: In the whole application, pick an area and do work in that area. Some of them aren't going to materialize for awhile but, for example, the use of data bases for tracing historical ideas and doing fundamental concept analysis will ultimately exist, but it will be rough going for a time. I think large data bases will trigger a lot of ideas in themselves.

Dave: What kind of data bases and how would people get access to them?

Gordon: I think personal data bases will be developed and used as tools. For example, right now we are building a computer museum and there are already a couple of programs; one that keeps track of everything in the museum, whether a manual or a part, or whether there is a manual for a part, whether there is a photograph of a part or a negative attached to that; just keeping track of those kinds of things. That was a natural thing that we needed. Also, a program to lead one through the museum; those kinds of things. There is some fairly interesting work being done now in computer graphics and computer art. Those are all possibilities. I don't know what the opportunities are in the language area, but there are new ideas that say maybe we can do reasonable machine-aided translation. We would like to see a machine-aided translation aid, say for translating technical manuals. That's a really clear kind of application because the manuals are typically very sterile and you can have quite a stylized description particularly in describing how a piece of software works.

Dave: Our main criticism of most manuals is that they are just not clear enough.

I think large data bases will trigger a lot of ideas in themselves.

Gordon: This actually might help. You could write them in a more stylized form. I'm trying to push to use the 500 word basic language. It is a language which deals with a fairly small vocabulary; the theory is that it would be easier from which to translate — either mechanically or by human endeavor, from one natural language to another language. People get too hung up on vocabulary or syntax vs. context; that's why I need a wide vocabulary to express my thoughts.

Bell, cont'd...

Dave: I spoke to Dick Neisser recently, in the Artificial Intelligence field, and, after being involved in doing language translation and dealing with many failures, his strong feeling is that a computer will never be able to translate language because it doesn't have the same cultural heritage to provide the context in which thoughts and sentences are expressed; that without understanding the context, it couldn't really translate.

Gordon: That's right. If you try the general problem it can't do general language translation.

Dave: But by translating text books or manuals you provide the context.

Gordon: Yes, an extremely well defined context. Also remember that I said "machine-aided," not machine translation. Just getting 90% of the thing out and then cleaning it up may be the right way to do it.

Dave: Just prior to the time I left DEC in 1974 I remember Ken Olsen (president of DEC) saying that he couldn't see any need or any use for a computer in someone's home and, as I recall, at the time you took some issue with that. Then he repeated it several years later at the World Future Society meeting in Boston and some people in the audience took issue with that. How does he feel today?

Gordon: We have a word processing terminal at home, and it also runs the payroll and the accounts payable. I've had a terminal at home for at least ten years, probably more. Right now we do a lot of word processing, a little computing for accounts payable but fundamentally the real computing is somewhere else. We use it 10 to 20% of the time as a terminal to the electronic mail system. Ken also has a terminal at home. I personally wouldn't recommend anything other than a terminal for home because microcomputers aren't big enough. Right now I don't think I want a home computer because I have always used a big computer and why should I live with a little computer when I can have access to a big computer?

Dave: Are there any projects on the horizon at DEC that push down into the real micro area besides the LSI-11?

Gordon: We just announced an 11-23. It's a little cheaper than the current LSI-11. We are gradually getting into that area. We don't want to give up this main base that we have at the current price level. Lots of the machines do end up in the home like that.

Dave: What's a useful thing for younger children, say 6th, 7th and 8th grade to do with computers other than play games and write games and have fun with them.

Gwen: Edit their papers. Writing and rewriting by hand is really difficult for a kid.

Gordon: With a computer, they can do a real quality job. Maybe the best thing that happens is you get kids into thinking rapidly.

Dave: I see text editing probably affecting the biggest base of the population.

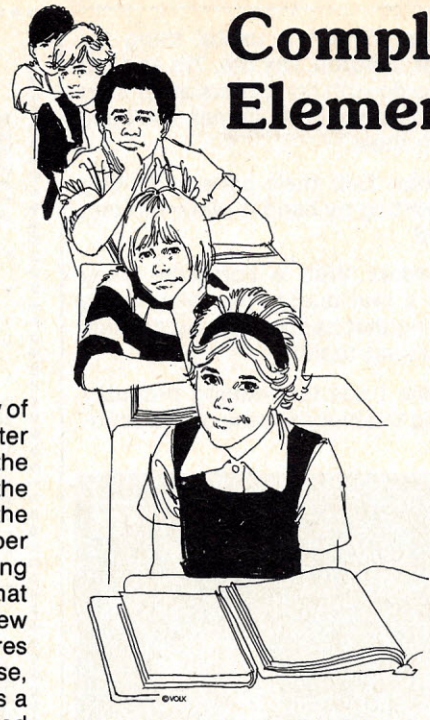
The Brown Symposium, "Bridging the Gap Between Theory and Practice" brought together Gordon Bell and Don Knuth.

Gordon: For younger children I think, voice, music and graphics I/O are probably the only things that are going to attract them. Games may be attractive but I think it is really important for all children to learn about programming. I think, from a computer design standpoint, it means we've got to have attractive enough transducers so they find out that it is worth them getting on so they can get some reasonable output. We've gone through the high school era where essentially students had no reward for writing a program, because they didn't get anything back. They would write a program to play blackjack, but blackjack isn't that much fun. Usually it was on a teletype and that's not much fun either. We have a daughter who would like to learn to program; she's a musician and if we had good transducers on the machines I think she'd go on immediately. We're not very far away from having that rich environment where there is a reward to have it do something.

Dave: We've been working recently with the ALF music boards for the Apple. It gives you a regular staff of music. You put the note where you want it with your paddle control. Then press the button and you can program up to six parts and play them backward, forward and upside down and experiment anyway you want. You can really relate to that. □

Complexity Theory and Elementary Mathematics

Kenneth Sipser, Ph.D.
and
Michael Sipser, Ph.D.



In a very general way, the theory of complexity as it refers to computer technology, deals with determining the extent of the equipment needed for the completion of a specified task. In the process, it seeks to reduce the number of components through developing greater efficiency amongst those that are in a system, and by producing new designs for expediting procedures within systems. In another sense, complexity theory can be viewed as a means of examining the time required to accomplish a specified task. Not only is the issue of determining the complexity of a problem of significant theoretical interest, but it is also of substantial practical value since, if an efficient algorithm can be brought to bear on the solution of a problem, then the running time required for problems containing large numbers of cases might be significantly shorter.

Interestingly, in certain problems, the time required for solution is directly related to the number of multiplications required. We assume that the basic computer arithmetic operation is addition, requiring, for all intents and purposes, insignificant processing time. Multiplication, on the other hand, based on multiple additions generally requires time which is substantially greater than that of addition. Thus, if a problem containing a number of multiplications is reduced by one or more of them, even at the cost of several additions, the solution method has been made more efficient.

In order to demonstrate this point, suppose we examine the elementary problem of finding the coefficients of the polynomial resulting from the multiplication of the two binomials, say, $5X + 3$ and $2X + 1$. Our usual procedure would require four multiplications as follows:

$$\begin{array}{r} 5X + 3 \\ 2X + 1 \\ \hline 10X^2 + 6X \\ \quad + 5X + 3 \\ \hline 10X^2 + 11X + 3 \end{array}$$

Kenneth Sipser, Ph.D., Dept. of Secondary Education, State University College, Oswego, NY 13126. Michael Sipser, Ph.D., Computer Science Div., University of California, Berkeley, CA 94710.

Can the coefficients of the product polynomial be found in three multiplications? Surprising as it may seem, the answer is yes! First, add the coefficient and constant term of the first binomial $5 + 3 = 8$, and of the second $2 + 1 = 3$. Find the product of these sums $8 \times 3 = 24$. That's one multiplication. Multiply

Complexity theory can be viewed as a means of examining the time required to accomplish a specific task.

the coefficients of the X terms $5 \times 2 = 10$, and of the constant terms $3 \times 1 = 3$. That takes care of 3 multiplications. The last two products obviously provide us with the coefficients of the X^2 and constant terms, respectively. The sum of the last two products $10 + 3 = 13$, subtracted from the product of the sums $8 \times 3 = 24$ yields the coefficient of the X term. Algebraically, given $AX + B$ and $CX + D$, let $S_1 = A + B$ and $S_2 = C + D$ represent the respective sums of A and B, and C and D. The product of these sums $S_1S_2 = AC + AD + BC + BD$. This is one multiplication. $A \times C = AC$ and $B \times D = BD$ produce the coefficients of the X^2 and constant terms, respectively. The differences $S_1S_2 - (AC + BD)$ produces the coefficient of the X term.

While we may reduce the number of multiplications required for finding the product of two polynomials from 4 to 3, a much more dramatic reduction may be made in the number of multiplications for the product of two matrices.

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix}\begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE + BG & AF + BH \\ CE + DG & CF + DH \end{pmatrix}$$

The product of two 2×2 matrices, employing the usual rules of the inner product for matrix multiplication requires eight multiplications. As the order of the matrices increases, the number of multiplications rises cubically so that two 3×3's require 27 multiplications, two 4×4's, 64 multiplications. A remarkable property of matrix multiplication is that the product of two $2n \times 2n$ matrices can be carried out by partitioning each of the matrices into four $n \times n$ matrices, calculating their respective inner products, and using these in the resulting 2×2 matrix multiplication

$$\left(\begin{array}{c|c} A & B \\ \hline C & D \end{array}\right)\left(\begin{array}{c|c} E & F \\ \hline G & H \end{array}\right) \quad \left(\begin{array}{c|c} AE + BG & AF + BH \\ \hline CE + DG & CF + DH \end{array}\right)$$

where the A, B, . . . are square matrix partitions of the original matrices. A reduction in the number of multiplications in the 2×2's by even one would therefore be significant, not so much for the saving represented by 7 multiplications over 8, but by the increasing difference developed as the order of the matrices increases. For example, in the case of the 4×4's this procedure yields 7^2 or 49 multiplications whereas it would ordinarily require 4^3 or 64 multiplications.

The Bridges of Koenigsberg is an old and famous problem which because of its simplicity has an appeal for students at all levels.

Before you start trying to solve this problem, be advised that in 1969, V. Strassen[1] in a paper "Gaussian Elimination Is Not Optimal" produced the 7 multiplication solution for the 2×2's. This is reproduced here without rationale, since an analysis of the procedure is beyond the scope of this paper. Given two 2×2 matrices:

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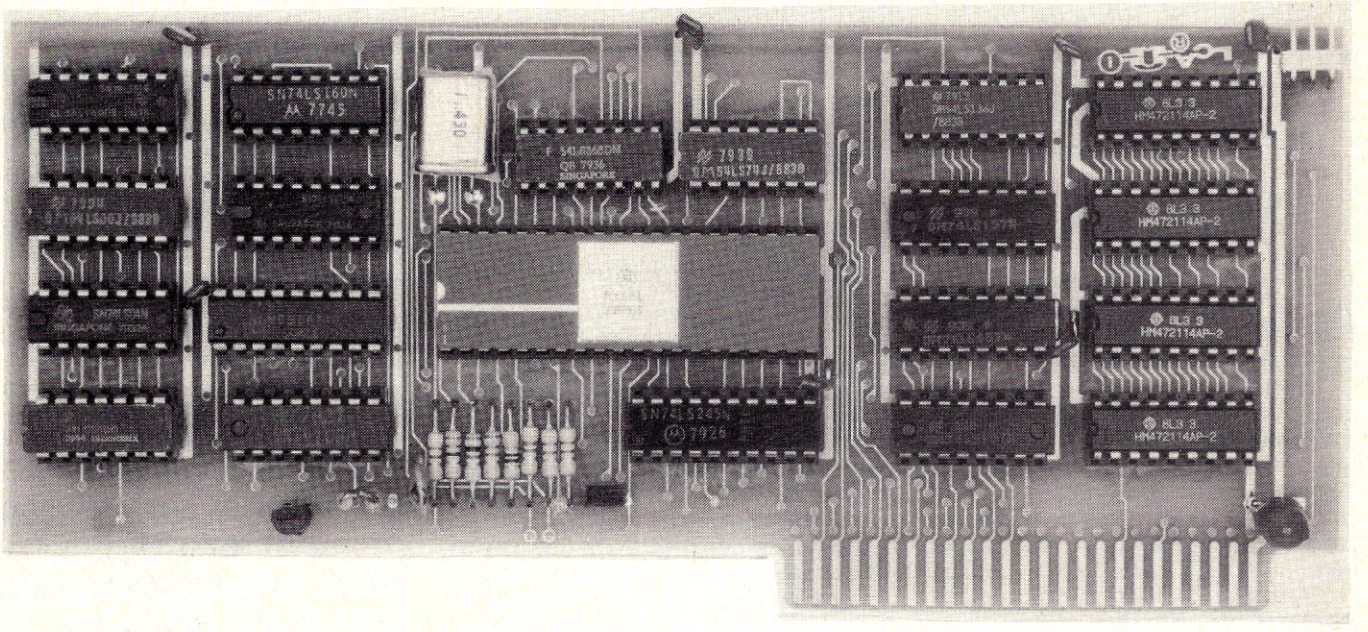

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Complexity, cont'd...

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{pmatrix}$$

where

$P_{11} = m_1 + m_2 - m_4 + m_6$
$P_{12} = m_4 + m_5$
$P_{21} = m_6 + m_7$
$P_{22} = m_2 - m_3 + m_5 - m_7$

where

$m_1 = (B - D)(G + H)$
$m_2 = (A + D)(E + H)$
$m_3 = (A - C)(E + F)$
$m_4 = (A + B)H$
$m_5 = A(F - H)$
$m_6 = D(G - E)$
$m_7 = (C + D)E$

The seven multiplications (m_i) are brought together by selective additions and subtractions in the four P_{jk}, so that $P_{11} = AE + BG$, etc.

Very recently another mathematician, Victor Pan,[2] of the IBM Thomas J. Watson Research Center, in a paper titled *"Strassen's Algorithm Is Not Optimal"* improved on this technique still further. Unfortunately, his results are also too intricate to be reproduced here.

Another aspect of complexity theory deals with the efficiency of algorithms as they relate to the solution of some mathematics problems. In general, those problems which can be solved algorithmically fall into certain categories according to the extent of their solvability. Two of these are: 1) P, the class of polynomial time problems, and 2) NP, the class of nondeterministic polynomial time problems. The first of these, containing problems on the order of the Bridges of Koenigsberg, have efficient solutions and are therefore solvable in polynomial time. This refers to that set of algorithms which can produce a solution in polynomial time growth as the problem size increases as opposed to those whose time growth is exponential. The Bridges of Koenigsberg is an old and famous problem which because of its simplicity has an appeal for students at all levels. In old Koenigsberg, now Kalinin, USSR, there are two islands in a river which are connected to each other and to the two banks by seven bridges (see Figure 1). The question is: can one start at any point and cross all of the bridges exactly once? The problem can be attacked by brute force, that is, by listing all of the possible paths, and

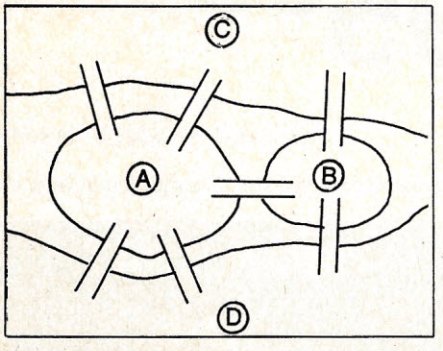


Figure 1

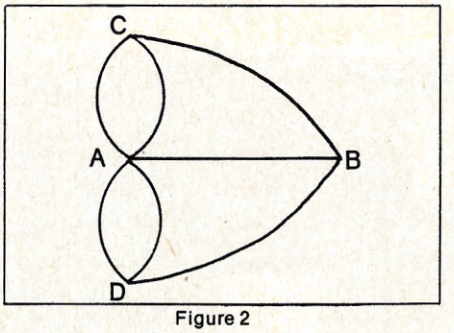


Figure 2

then finding the solution(s) if there are any. The mathematician, Leonhard Euler, solving this problem more efficiently, wrote of the listing solution: "This method is too tedious and too difficult because of the large number of possible combinations, and in other problems where many more bridges are involved it could not be used at all."[3] Euler produced a point-line graph of the islands and bridges (see Figure 2), argued that each point, except the start and end, required one line leading to it and one leading away and must therefore have an even number of lines connecting them to other points. Since the point-line graph has four points all of which contain an odd number of lines, the tour is impossible. This solution method was qualitatively simpler than the brute force listing; Euler had produced a solution in polynomial time. On the other hand, problems which can be solved only through methods which are comparable to the brute force listing or other such inefficient methods are classified as nondeterministic polynomial time.

According to Ron Graham of Bell Telephone Laboratories "the trouble with this brute force approach is that as the number of tasks in a set becomes large the number of possible priority lists (and thus the number of schedules) grows so explosively that there is no hope of examining even a small fraction of them. If there are n tasks in a set, the number of different lists is n!, or n(n-1) (n-2) . . . 1, a very large number even for relatively small values of n. For example, when there are 20 tasks, even if a computer could check as many as a million schedules per second, it would take more than 70,000 years to check all 20 lists!"[4]

A problem which falls into the class NP is that of determining whether an integer is composite. There is no way of finding the factors of an integer other than the inefficient method of looking for proper divisors. There are indeed divisibility techniques for ruling out some unnecessary trials, but no algorithm exists which will reduce the number of trials to a point wherein the problem could be solved in polynomial time. Other well known problems which fall into this class are:

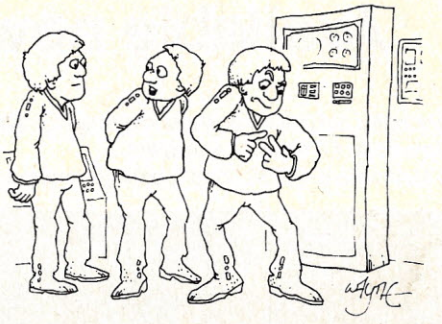
1) The Traveling Salesman Problem: Given a set of cities (points), find the shortest round-trip route connecting lines (air routes) in which all of the cities are visited.

2) The General Scheduling Problem: Given a set of identical machines, with a set of tasks to be performed, each with specific requirements for deadline time, priority of importance, running time and precedence constraints, find the most efficient schedule for assigning these tasks among the given machines.[5]

3) The Three Color Map Problem: Given a set of regions of a map, color all of the regions in one of three colors in such a way that no two adjoining regions share the same color.

Today's computers and telephone exchanges present problems beyond our understanding, but these systems are dwarfed by even the humblest biological systems.

There is a set of problems, of which the above three are members, which form a kind of super category, NP-complete. If a polynomial time algorithm can be found for any one of them, then with minor adjustments, the algorithm can be applied to all NP problems solving them in polynomial time as well. Accordingly, it is likely that NP-complete problems are difficult, if not impossible to solve efficiently.



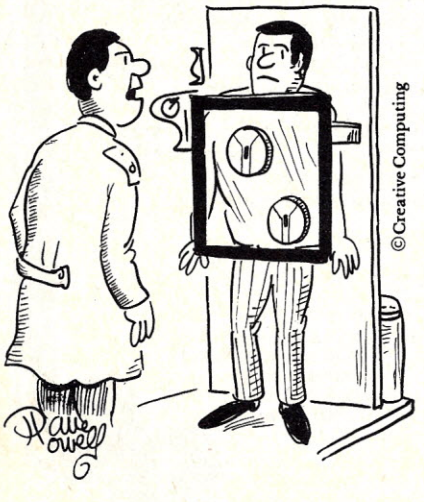
"You won't believe this, but Zarg can actually add without a computer."

Complexity, cont'd...

In this article we have attempted to overview this new and exciting field of complexity theory which links computer science with mathematics, and ultimately to the solution of theoretical as well as practical problems in society and technology. In an article on complexity theory as it refers to the solution of problems in telephone technology, Pippenger says: "Today's computers and telephone exchanges present problems beyond our understanding, but these systems are dwarfed by even the humblest biological systems. While complexity theory struggles with problems within its reach, far greater problems lie beyond."[7] □

References

1. V. Strassen, "Gaussian Elimination Is Not Optimal," Num. Math., Vol. 13, (1969), pp. 354-356.
2. Victor Pan, "Strassen's Algorithm Is Not Optimal. Trilinear Technique of Aggregating, Uniting and Cancelling for Constructing Fast Algorithms for Matrix Operations."
3. Euler, Leonhard, "The Seven Bridges of Koenigsberg". The World of Mathematics, edited by James R. Newman, Simon and Shuster, Vol. 1, p. 574.
4. Ronald L. Graham, "The Combinatorial Mathematics of Scheduling," Scientific American, Vol. 238, No. 3, (March, 1978), p. 128.
5. While most scheduling problems fall into the class NP, some special cases have been found to fall into P(polynomial time). Very recently Barbara Simons of the Computer Science Division at the University of California at Berkeley reported in her paper *"A Fast Algorithm for Single Processor Scheduling"* of her discovery of one such special case in which running time was held constant.
6. Harry R. Lewis and Christos H. Papadimitriou, "The Efficiency of Algorithms," Scientific American, Vol. 238, No. 1, (January, 1978), p. 107.
7. Nicholas Pippenger, "Complexity Theory", Scientific American, Vol. 238, No. 6, (June, 1978), p. 124.



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Do you dislike the tangle of 120 V. power cords behind your TRS-80? Is it difficult to find a wall outlet with three sockets?

Double outlet socket installed in back of monitor.

This problem affects most TRS-80 owners, but it is easy to fix: Just install a double socket on the back of your CRT monitor, as shown in Photo 1. Then you can plug your computer power supply and your cassette recorder into the monitor. Only one cord (the monitor cord) then needs to be plugged into a wall socket. A further advantage is that now the whole system can be turned on or off with one switch, the monitor "Power" switch.

How is this modification done? First, you must collect the necessary tools and materials. For tools, you will need a ¼" nut driver (it looks like a screwdriver, but has a ¼" hex socket on the end), a drill and bits, a coarse file, a screwdriver and a soldering iron. Materials required are a double electrical socket (the type used for wall outlets), about two feet of fairly heavy-duty electrical wire, solder and two nuts for the socket mounting screws (they are not included with the socket, as the socket screws were intended to screw into a wall outlet box).

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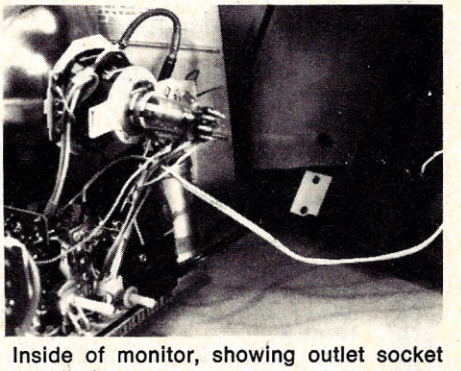
Now to work! First unplug the monitor, and place it face down on a soft surface. Be sure that it has been "off" long enough for the hazardous high voltage inside the case to dissipate. Use the nut driver to remove the five hex-headed screws holding the back onto the monitor (four are in deep recesses). Gently remove the back, being very careful of the CRT socket, which protrudes and is fragile. Mark where you want to put the double outlet socket, making sure that it will clear things inside the case. A spare outlet socket cover plate makes a good marking template. Drill starter holes through the plastic back, then file them to shape to accept the double outlet socket. This usually takes a bit of file and try, file and try. Drill holes for the socket mounting screws and mount the socket in place. Fasten one end of the wire pair under the screws of the socket, and solder the other end to the terminals under the CRT yoke, as shown in Photo 2.



Inside of monitor, showing outlet socket installation.

These terminals are shown in Figure 1. Now carefully put the back on again, being sure that the added wire has enough free space, and that the socket doesn't interfere with anything.

You can now plug your computer power supply and your cassette recorder into the back of your monitor and eliminate that tangle of power cords. Neatness triumphs! □

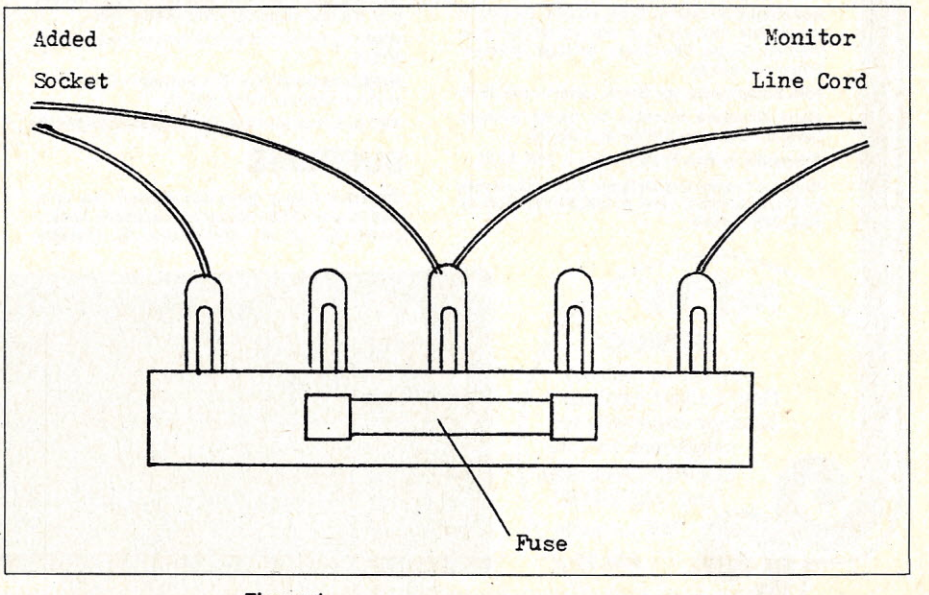
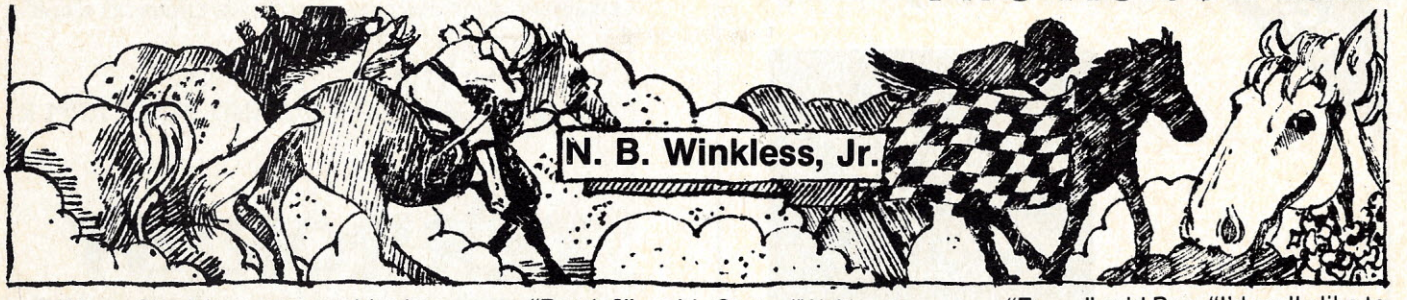


Figure 1.
Connections to monitor terminal board.

The Sport of Kings and a computer

Stan and the Two-Horse Team



When Stanislaus came whipping into the living room in his Little League gear, his pop looked up from the Racing Form and smiled.

"My boy!" said Pop, "I have a problem for you and your pile of semiconductors."

'Two bits an hour for consultation and the programming, and a buck a page for printouts," Stan said. "What's up?"

"That ought to come to about three or four dollars," Pop said.

"The meter is running," Stan said. "C'mon up to my room."

"Strictly a hypothetical case," Pop said. "We don't much approve of horse race gambling, you know." Stan gave him a look and a nod. So Pop laid it out:

In any one race, there might be two horses that look too good to ignore. Either could win. Suppose a person wants to bet on both. Now, each will be offered at some price, such as 5 to 2, or 4 to 1, or whatever. Can we make the computer tell us how much to bet on each, so as to yield a profit of, say, a hundred dollars?"

"Easy," said Stan, turning on the power and loading Basic. And he wrote:

```
10 INPUT "FIRST HORSE PAYS";A
20 INPUT "...FOR WHAT BET";B
30 INPUT "SECOND HORSE PAYS";C
40 INPUT "...FOR WHAT BET";D
50 INPUT "PROFIT WANTED";P1
```

And he stopped to think.

Then he wrote:

```
100 X=B/(A+B):Y=D/(C+D)
```

"These will be decimal fractions. I think if we add them, and subtract their sum from 1 . . . "

```
110 Z1=X+Y: Z=1-Z1
```

"And then find the ratio between each decimal value and the remainder Z . . . and multiply that by the profit you want . . . we'll have it." He wrote:

```
120 B1=INT((X/Z)*P1+.5):D1=INT((Y/Z)*P1+.5)
```

"I've gone for the integer, rounding up. Okay?"

Pop let his jaw hang open but didn't speak.

```
130 PRINT B1, D1
```

"Ready?" said Stan. "We'll use what you said, 5 to 2 and 4 to 1, and one hundred dollars." He tapped in RUN, and filled in the INPUTS.

The screen said "56 39".

"Want to check that out?"

Pop did. He found that 56 bet at 5 to 2 would yield 140, minus the 39, to leave a profit of 101. And 39 at 4 to 1 would yield 156, less the 56, for a profit of 100.

"Terrific!" Pop said.

"Good," said Stan. "That'll be 15 cents, unless you want me to print it."

"Er . . . " said Pop. "I'd really like to have it on paper, as tables, y'know? And there are other ratios —"

"How many?" said Stan.

"Uh, forty-nine altogether."

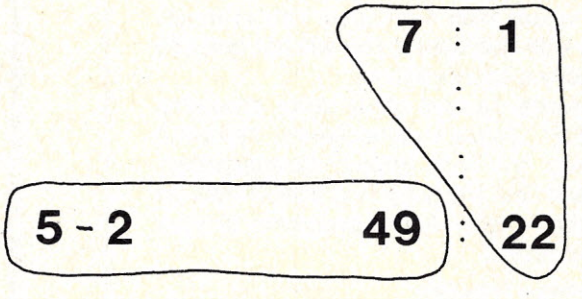
"Gulp," said Stan. "The calculations are easy, but the formatting is going to be a problem, and I'm not sure about that rounding-up routine. Do you mind if we have supper before I knock this off?"

Stan is fast, but it took him most of Sunday to get things to the point where he showed his pop a partial printout:

Exhibit A Stan on bet ratios

	7 ¦ 1	8 ¦ 1	9 ¦ 1	10 ¦ 1	11 ¦ 1	12 ¦ 1	13 ¦ 1
6 – 5	109 ¦ 30	105 ¦ 26	103 ¦ 23	100 ¦ 20	99 ¦ 19	98 ¦ 17	96 ¦ 16
7 – 5	92 ¦ 28	89 ¦ 24	87 ¦ 21	85 ¦ 19	84 ¦ 17	83 ¦ 16	82 ¦ 14
3 – 2	85 ¦ 27	82 ¦ 23	80 ¦ 20	79 ¦ 18	78 ¦ 17	77 ¦ 15	76 ¦ 14
8 – 5	79 ¦ 26	77 ¦ 23	75 ¦ 20	74 ¦ 18	73 ¦ 16	72 ¦ 15	72 ¦ 14
9 – 5	69 ¦ 25	68 ¦ 21	67 ¦ 19	65 ¦ 17	64 ¦ 15	64 ¦ 14	63 ¦ 13
2 – 1	62 ¦ 24	60 ¦ 20	59 ¦ 18	58 ¦ 16	58 ¦ 15	57 ¦ 14	56 ¦ 12
5 – 2	49 ¦ 22	48 ¦ 19	47 ¦ 17	46 ¦ 15	46 ¦ 14	45 ¦ 13	45 ¦ 12
3 – 1	40 ¦ 20	40 ¦ 18	39 ¦ 16	38 ¦ 14	38 ¦ 13	38 ¦ 12	37 ¦ 11
7 – 2	35 ¦ 20	34 ¦ 17	33 ¦ 15	33 ¦ 14	32 ¦ 12	32 ¦ 11	32 ¦ 11
4 – 1	30 ¦ 19	30 ¦ 17	29 ¦ 15	29 ¦ 13	28 ¦ 12	28 ¦ 11	28 ¦ 10
9 – 2	27 ¦ 19	26 ¦ 16	26 ¦ 14	26 ¦ 13	25 ¦ 12	25 ¦ 11	25 ¦ 10
5 – 1	24 ¦ 18	24 ¦ 16	23 ¦ 14	23 ¦ 13	23 ¦ 12	23 ¦ 11	22 ¦ 10

The calculations are based on $100 wins (approximate). The left-hand number is the bet on the pick at the left end of the line. The right-hand number is the bet on the pick at the top of the column. Example:



If your two picks go at 7 to 1 and 5 to 2, you put $22 on the 7-1 shot and $49 on the 5-2 shot. If the 7-1 comes home you win 7 times 22, or $154, and lose $49 — profit $105. If the 5-2 comes home you win 5/2 times 49, or $122.50, and lose $22 — profit $100.50.

To win more or less, just adjust the bets. That is, to win $50, bet half of what the tables show. To win $200, bet twice what the tables show.

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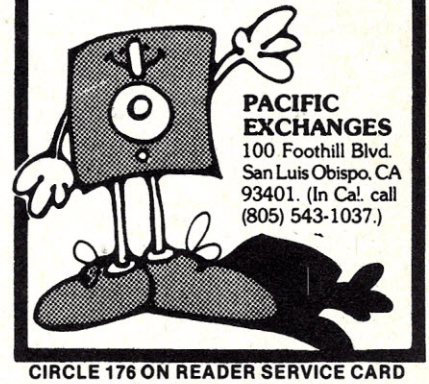

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Two-Horse, cont'd . . .

"I'm going to fill one page with this," he said, "and there will be six more pages."

"Wow," said Pop. "Will I understand the program?"

"I think so. I wrote in a lot of explanation, just for you."

```
1 !FORMATTED FOR 7 COLUMN RATIOS AND 1 RATIO AT THE LEFT
9 POKE(16R0512)=130:! Sets maximum printer width
10 GOSUB 450: PRINT CHAR$(6);
11 !      Turns on printer, clears the screen
20 DIM A(49),B(49),C(49),D(49):!We'll need these subscripts
21 ! We're 'filling the boxes' with ratios to draw on in succession
22 C(1)=1:C(2)=1:C(3)=2:C(4)=1:C(5)=3:C(6)=4:C(7)=1:C(8)=6
23 D(1)=9:D(2)=5:D(3)=5:D(4)=2:D(5)=5:D(6)=5:D(7)=1:D(8)=5
24 C(9)=7:D(9)=5:C(10)=3:D(10)=2:C(11)=8:D(11)=5:C(12)=9:D(12)=5:C(13)
=2:D(13)=1:C(14)=5:D(14)=2:C(15)=3:D(15)=1:C(16)=7:D(16)=2
25 C(17)=4:D(17)=1:C(18)=9:D(18)=2:C(19)=5:C2=5
26 FOR C1=20 TO 39:C2=C2+1:C(C1)=C2:NEXT C1:C1=0:C2=0
27 C(40)=30:C(41)=35:C(42)=40:C(43)=45:C(44)=50:C(45)=60:C(46)=70:C(47
)=80:C(48)=90:C(49)=99
28 FOR D1=19 TO 49:D(D1)=1:NEXT D1:D1=0
29 FOR D8=1 TO 49:A(D8)=C(D8):B(D8)=D(D8):NEXT D8: D8=0
60 D$=CHAR$(27)+CHAR$(31)+CHAR$(9):OPEN 0"*P":PUT 0 D$;:CLOSE0
61 ! Line 60 sets horizontal character spacing
70 GOSUB 460:!Turns off the printer
80 INPUT "HOW MUCH YOU WANNA WIN ON THIS PAIR OF BETS";P1
91 INPUT "START TOP LINE WHERE";T1:! Can't get it all on one page, so.
..
93 INPUT "START LEFT LINE WHERE";L1:! Mostly for trial runs
94 C1=T1: C2=T1
95 R=12
99 Q2=0
100 !Starts printing the top line of ratios
102 C1=C1+1:! Counters to move up the line of subscripted boxes
103 C2=C2+1
106 A=A(C1):B=B(C2):! Extracts the values from the boxes
110 K$=STR$(A):L$=STR$(B):!Turns the numbers into strings for formatti
ng
111 IF LEN(K$)<6 THEN K$=" "+K$: GOTO 111:! Formats neatly
112 IF LEN(L$)<6 THEN L$=L$+" ": GOTO 112
115 M$=K$+"|"+L$
120 !Next line turns on the printer again
129 GOSUB 450:PRINT TAB(R);M$;:!Printing the headers
132 R=R+15
136 Q2=Q2+1:IF Q2=7 THEN Q2=0:R=0:T=0:GOTO 160:!Limits column headers
to seven
140 GOSUB 460
150 GOTO 100:! Returns to find the next values
160 ! I used to have a line here.
190 C3=L1:C4=L1:! Permits choosing start-point for left column
200 ! Prepparing to print the second ratio, left column
201 IF T4=49 THEN 1000:!Cuts off after49 lines
202 C3=C3+1
203 C4=C4+1
205 IF C3>49 THEN 1000
206 C=C(C3):D=D(C4):! Sets up next ratio in left column
208 X$=STR$(C)
209 Y$=STR$(D)
210 IF LEN(X$)<4 THEN X$=" "+X$:GOTO210
218 GOSUB 450:! Turns on printer again
220 PRINT:PRINT X$+"-"+Y$;:! Prints the left ratio
230 T=9
240 GOSUB 460:! Turns off printer
290 C1=T1: C2=T1:! Picks values from boxes to correspond with headers
300 T=13:! Sets tab stop
302 C1=C1+1:!Increments box-count as we go along
303 C2=C2+1
304 IF C1>50 THEN 1000:!Cuts off if too deep.  Do we need this?
306 A=A(C1):B=B(C2)
307 T3=T3+1
```

```
310 GOSUB 400:!We'll calculate at 400+
315 IF D1<0 THEN A$="  NO ": GOTO 322:!If impossible, say No
316 A$=STR$(D1):! ... else make a string of the value
317  IF LEN(A$)<6 THEN A$=" "+A$: GOTO 317
322 IF B1<0 THEN B$=" NO  ":GOTO 339
328 B$=STR$(B1):!Stringing helps the formatting in neat columns
329  IF LEN(B$)<6 THEN B$=B$+" ": GOTO 329
339 GOSUB 450:! Turns on the printer again
340 E$=A$+"|"+B$: PRINT TAB(T);E$;:! Prints the bets
345 T=T+15:!Incrementing the tab set
350 GOSUB 460:! YOU know; turns off printer
355 IF T3=7 THEN T3=0:T4=T4+1:GOTO200:! Cuts off after seven columns
360 GOTO 302:! Returns to cycle for next bet on the line
400 X=B/(A+B): Y=D/(C+D):!The decimal frac of the two odds — remember
?
405 IF A/B=D/C THEN D1=-1:B1=-1: GOTO 440:! Can't work out if
406 ! the two ratios are reciprocals.  Think about it.
410 Z1=X+Y: Z=1-Z1:! Adds them and takes their complement of 1, per br
ief example
420 B1=INT((X/Z)*P1):!Calcs per example
430 D1=INT((Y/Z)*P1)
431 ! Abandoned the simple '+.5' rounding-off method...
432 ! because it didn't seem to work for everything.
434 IF B1<0 OR D1<0 THEN 440:! Eliminates certain impossibles
435 M1=B1*(A/B)-D1:IF 0 AND M1>=P1 THEN O=0: GOTO 440
436 IF M1<P1 THEN B1=B1+1:GOTO435
437 M2=D1*(C/D)-B1
438 IF M2<P1 THEN D1=D1+1: GOTO 437
439 IF M2>=P1 THEN O=1:GOTO435
440 RETURN:!Goes back into program at 320
445 !435 to 439 is one giant effort at rounding-off.  Obvious?
450 PRINT CHAR$(16);: RETURN
460 PRINT CHAR$(15);: RETURN

1000 !PRINT: PRINT: PRINT:PRINT:PRINT CHAR$(16)
1005 PRINT "THE FORM ' XX | YY' SHOWS  BETS TO GAIN $100 (APPROX)"
1006 PRINT "USING THE XX FIGURE FOR ODDS AT THE LEFT,"
1007 PRINT "     THE YY FIGURE FOR THE ODDS AT TOP OF COLUMN."
1010 PRINT "TO GAIN MORE OR LESS, MULTIPLY OR DIVIDE THE $100."
1020 PRINT "(THAT IS, TO GAIN ONLY $50, BET HALF WHAT'S SHOWN."
1025 PRINT "TO GAIN $200, BET TWICE WHAT'S SHOWN.)"
1030 PRINT CHAR$(15)
1100 END: !At last!!
READY
```

"Er, Stanislaus," Pop said. "Suppose we adjust this to handle three or four horses in a race . . . "

"I've been thinking about that, Pop. Four horses would take the tables to 7 times 49 times 49 pages. At a buck a page, that'll be about $17,000. I'm game for it if you are Pop.Pop?Pop?"□

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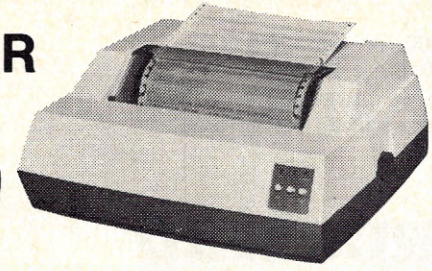

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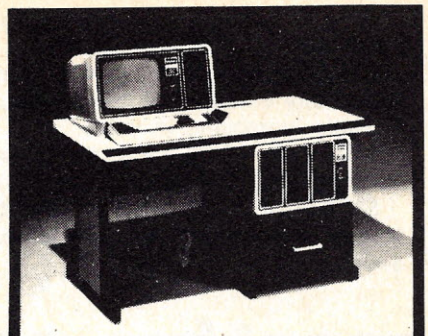

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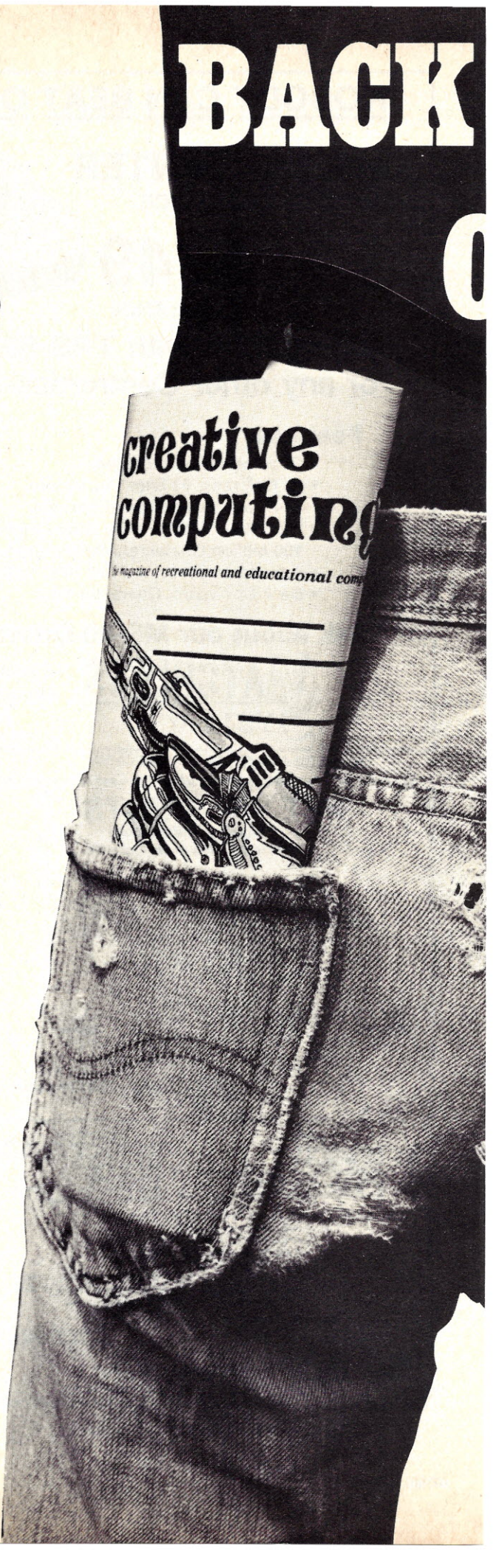

ISSUES

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ROM

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A new game for the Apple...

Ten to the Thirty-Eighth

William Bradford

Readers of Martin Garner's book "New Mathematical Diversions from Scientific American," may recognize the game described here. It is a version of the game "Googol," discussed in Gardner's book. I will explain later why I changed the name of the game. I have also added some twists which you may find of interest.

A googol is the number ten multiplied by itself one hundred times.

Invention of the original game of Googol is attributed to John H. Fox, Jr. and L. Gerald Marnie. As described in Garnder's book, the game is played by having someone (the computer in this case) select a number of slips of paper. On the back of each slip, a positive number is written which you are not allowed to see. The values of the numbers range from small fractions up to numbers the size of a "googol" or larger. A googol is the number ten multiplied by itself one hundred times, or "ten-to-the-one-hundredth." The game thus derives its name from the not very ridgidly defined upper limit to the numbers written on the slips.

When all the numbers have been written down, the slips are randomized and placed face down. You then turn the slips face up, one at a time. The object is to stop when you turn up the number which you guess to be the largest. The last slip which you choose to turn up is your guess. You may not go back to a previously revealed slip. Should you turn over all the slips, the last one must be your guess.

The program described here follows the original game closely. However, the largest number which can be represented in Applesoft II is 10^{38} (ten to the thirty-eighth), hence the name of this version. Also, you get to choose the number of slips to use (from 3 to 14). These two facts tend to help you since you know that with a small number of slips to choose from, a number of 10^{37} or greater is almost certainly the largest. In the original game, the googol is not necessarily the upper limit, so that you are never certain of any large number.

I will not go into the detailed analysis of the odds of your finding the highest number. I'll only quote the results of the argument attributed to L. Moser and J. R. Pounder. You may derive it for yourself or refer to Gardner's book.

The strategy is to select p slips out of the n available. Note the largest value among the p slips and then continue selecting from the remaining slips until you find a larger number. The following formula gives the probability of finding the largest number in n slips;

$$\frac{p}{n}\left(\frac{1}{p} + \frac{1}{p+1} + \frac{1}{p+2} \cdots + \frac{1}{n-1}\right)$$

Given n, p is determined by picking a value for p which gives the largest value to the above expression. For example, if n = 10 then p = 3. For other values of n, you are urged to determine p for yourself. (You didn't buy that computer just to play Star Trek, did you?) Of course, as I mentioned above, the fact that you know the upper bound to the possible values does put the odds a little more in your favor.

While writing the program to play this game, it occurred to me that it might be interesting to skew the odds a little. Since the computer is turning over the slips, it is possible for it to lie to you about the value of any slip. The false value you get is chosen at random, so it may be higher or lower than the true value. If knowing that the machine may be lying to you is not enough, you can have it tell you when it is lying. Of course, it won't tell you until after you have made a bet or chosen another slip.

You now know the essential facts about the game. The program was written for an Apple II in Applesoft II, so it should be fairly portable to other machines using Microsoft's Basic. The program is set up to handle from one to four players. Players make their bets before selecting a slip to turn over. Only one slip is turned over at a time, so players should work out who does the selecting. When a slip is turned over, each player is offered the chance to stop. All players may continue to bet until all the players have chosen. Bets may not be decreased, but they may remain fixed at any value. When the last player has selected, all of the strips are revealed with their true values. The slip with the largest value is shown in flashing mode. Wins and losses are computed and displayed and the players' funds adjusted accordingly. At this time new players may be added, the number of slips changed, or the game option may be changed.

The googol is not necessarily the upper limit

The program shown in the accompanying listing has some features which are designed with the Apple II video output in mind. The strips are shown in the INVERSE video mode, while the bets and available funds are shown in the NORMAL video mode.

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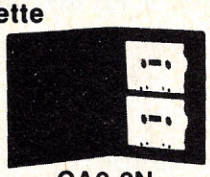

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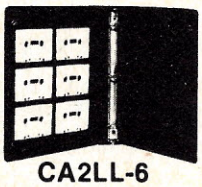

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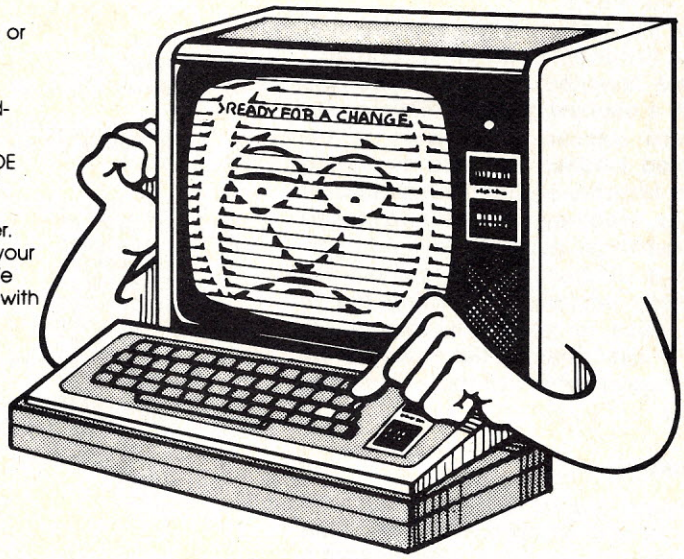

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10^{38}, cont'd . . .

When a player wins, the word WIN is shown in FLASHING mode above his bet. Similarly, the winning number is shown as a flashing number. If hard copy output is desired, several statements (205, 403, 406, 1207 and 1314) will require some modification. In fact, for a hard copy only device, statements 1200 through 1220 can be deleted.

Since the computer is turning over the slips, it is possible for it to lie to you about the value of any slip.

In the course of writing this article, it occurred to me that it would be interesting to see a version of the game where the computer is a player. Perhaps an interested reader could contribute a program to do so to Creative Computing. Another option would be to have the computer display a blank slip instead of lying. The slip would not be turned over until all bets were in. Other possibilities include more sophisticated schemes for having the computer lie, such as telling you that it has lied when it really hasn't. Of course, we humans can generally lie better than a computer (at least until a HAL 9000 type of computer shows up), so there are many such variations. Take advantage of the "Input/Output" column to share your ideas. In any case, the idea is to have a little fun with your brain and its extension, your computer.

For those of you who are wondering about the origin of the term "googol," is was invented by a nine year old child, a nephew of mathematician Dr. Edward Kasner. Dr. Kasner, a respected teacher, is noted as having given lectures on the mathematics of infinity, topology and other advanced mathematical subjects to kindergarten-age children. The reasoning of Dr. Kasner's nephew concerning the finite value of googol is interesting, and is described in the selection by Drs. Kasner and Newman referenced below. □

References

Gardner, Martin, New Mathematical Diversions from Scientific American, Simon and Schuster, New York, 1966, Chapter 3, Problem 3.

Kasner, Edward and James R. Newman "New Names for Old" in The World of Mathematics, Simon and Schuster, New York, 1956, Volume 3, page 2009.

SAMPLE RUN

```
RUN
10^38
(TEN TO THE THIRTY-EIGHTH)
A BETTING GAME FOR THE APPLE II
PROGRAMMED BY L. W. BRADFORD
DO YOU WANT INSTRUCTIONS? (Y/N)N

GAME OPTIONS
 1STRAIGHT UP GAME (I DON'T LIE)
 2'RUSSIAN ROULETTE'(I LIE TO YOU)
 3LIKE NO. 2, BUT I TELL YOU WHEN
 I AM DEALING A BOGUS NUMBER
IF THIS ISN'T CLEAR,SEE THE INSTRUCTIONS
WHICH? 3


HOW MANY PLAYERS? (1 TO 4) 1

YOU'RE OUT OF CASH NO. 1
DO YOU WISH TO BORROW SOME? Y
OK, HOW MUCH? (LIMIT IS $1000) 1000
  HOW MANY SLIPS OF PAPER DO YOU WISH TO  PICK FROM? (MAX = 14)
?9


BETS  0
FUNDS 1000
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?5
BETS  5
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?5
695520.399
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?5

BETS  5
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?2

2.40168801
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?10

BETS  10
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?7
.055058695
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?10

BETS  10
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?8

3.51407399E+29
DO YOU WISH TO STOP NOW NO. 1?Y


ALL BETS ARE NOW IN
4328953.03
2.40168801
4952400.91
7.5659165
695520.399
133182.867
.055058695
3.51407399E+29

47.9456399
THE CORRECT NUMBER WAS 3.51407399E+29 !
WIN
10
FUNDS
1010
?

DO YOU WISH TO CHANGE GAME OPTION?N
DO YOU WANT TO CHANGE THE NUMBER OF PLAYERS?N
BETS  0
FUNDS 1010
  HOW MANY SLIPS OF PAPER DO YOU WISH TO  PICK FROM? (MAX = 14)
?3
```

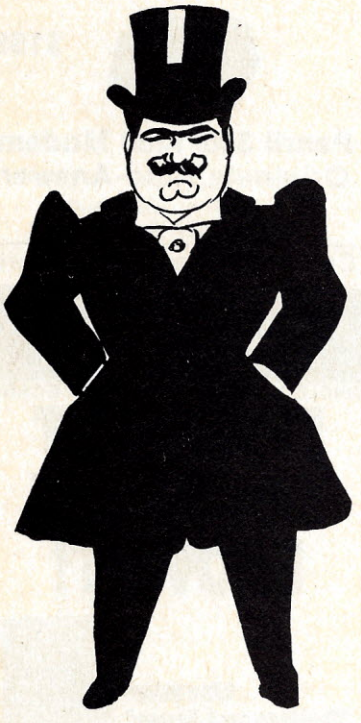
```
BETS  0
FUNDS 1010
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?1000

BETS  1000
FUNDS 1010
WHICH STRIP DO YOU WISH TO SEE?2

5.866947E+27
DO YOU WISH TO STOP NOW NO. 1?Y


ALL BETS ARE NOW IN
.427343843        1
5.866947F+27      2

1701507.38        3
THE CORRECT NUMBER WAS 5.866947E+27 !
WIN
1000
FUNDS
2010
?
```



```
1  TEXT : HOME :Y$ = "Y":N$ = "N"

2  DIM S(15),B(4),F(4),CH(4)
3 NG = 0: GOTO 3000
100  REM  PRINT BETS AND FUNDS AV
AILABLE AND HEADERS FOR THEM

101  POKE 34,16: POKE 35,19
105  VTAB 16: HTAB 1: PRINT "BETS
  ";
106  FOR R = 1 TO PM
107 PS = R * 8
108  VTAB 16: HTAB PS: PRINT B(R)

110  NEXT R
112  VTAB 18: HTAB 1: PRINT "FUND
S ";
114  FOR R = 1 TO PM
115 PS = R * 8
116  VTAB 18: HTAB PS: PRINT F(R)

118  NEXT R
120  RETURN
198  REM  PRINT OUT THE NUMBER FO
R STRIP ST IF VALUE IS NEGAT
IVE THEN STRIP HAS BEEN TURN
ED OVER ALREADY
200  IF S(ST) < 0 THEN 250
201 R =  INT ((ST + 1) / 2)
202 CL = ST - 2 * (R - 1)
203  POKE 34,0: POKE 35,16
204  VTAB R * 2 - 1:PS = 22 * (CL
 - 1): IF PS = 0 THEN PS = 4

205 : HTAB PS: INVERSE : PRINT  ABS
(S(ST))
206  NORMAL : POKE 34,20: POKE 35
,23
207 XP = XP + 1:ERR = 0
208  HOME : VTAB 20
209 S(ST) =  - S(ST)
210  RETURN
211  REM  TEST FOR GAME OPTION, P
RINT MESSAGE FOR LIE (IF NEE
DED)
212  IF W = 1 THEN  RETURN
213  IF ST <  > L THEN  RETURN
214  IF W = 2 THEN 230
216  PRINT "THE VALUE JUST SHOWN
IS NOT A TRUE ONE!"
218  GOSUB 990
230 S(L) =  - TE
234  RETURN
250  PRINT "THAT NUMBER HAS ALREA
DY BEEN SHOWN
252  GOSUB 990
253 ERR = 1
254  RETURN
298  REM  A CHOICE HAS BEEN MADE
BY PLAYER R. IF HE STOPS SET
 HIS CHOICE FLAG.
300  FOR R = 1 TO PM
302  IF CH(R) <  > 0 THEN 320
303  HOME
304  PRINT "DO YOU WISH TO STOP N
OW NO. ";R;: INPUT A$
306  IF A$ <  > Y$ AND A$ <  > N$
 THEN 304
308  IF A$ = N$ THEN 320
310 CH(R) = ST
314 WS = WS + 1
320  NEXT R
330  RETURN
398  REM  TEST FOR WINNERS. BALAN
CE THE PLAYERS' FUNDS
400  FOR R = 1 TO PM
401 PS = R * 8
402 Q = CH(R): IF S(Q) <  > MX THEN
406
403  VTAB 15: HTAB PS: FLASH : PRINT
"WIN"
405 SG = 1: GOTO 410
406  VTAB 15: HTAB PS: INVERSE : PRINT
"LOSE"
407 SG =  - 1
410  VTAB 16: HTAB PS: PRINT B(R)

412 F(R) = F(R) + SG * B(R)
414  VTAB 18: HTAB PS: NORMAL : PRINT
"     ": VTAB 18: HTAB PS: NORMAL
: PRINT F(R)
416 B(R) = 0: NEXT R
420  RETURN
598  REM  BANKING ROUTINE  SET UP
 LOANS AND CLEAR ACCOUNTS
600 R = 1: IF F(R) > 0 THEN  RETURN

605  POKE 34,20: POKE 35,23: HOME
: PRINT "YOU'RE OUT OF CASH
NO. ";R: INPUT "DO YOU WISH
TO BORROW SOME? ";A$
606  IF A$ <  > Y$ AND A$ <  > N$
 THEN 605
608  IF A$ = Y$ THEN 620
610 F(R) =  - 1: PRINT "OK! BE SE
EING YOU!"
612  RETURN
620  INPUT "OK, HOW MUCH? (LIMIT
IS $1000) ";F(R)
621  IF F(R) < 0 THEN 621
622  IF F(R) < 1000.01 AND F(R) >
0 THEN  RETURN
624  IF F(R) > 1000 THEN 630
626  INPUT "DO YOU WISH TO QUIT?
";A$
627  IF A$ <  > Y$ AND A$ <  > N$
 THEN 626
628  IF A$ = Y$ THEN 610
630  PRINT "LET'S TRY AGAIN": GOTO
620
650 I = 1
654  IF F(I) <  >  - 1 THEN 664
656  FOR R = I TO PM - 1
658 B(R) = B(R + 1):CH(R) = CH(R +
1):F(R) = F(R + 1)
660  NEXT R
662 PM = PM - 1:P0 = PM
664 I = I + 1: IF I > PM THEN  RETURN

670  GOTO 654
698  REM  TAKE BETS  A BET OF 0 (
ZERO) DEALS YOU OUT (HOWEVER
, YOU ARE ASKED TO CONFIRM Y
OUR DESIRE TO QUIT)
700  POKE 34,20: POKE 35,23
705  HOME : VTAB 21
710  PRINT "TIME TO PLACE YOUR BE
TS!"
720  PRINT "HOW MUCH DO YOU WISH
TO WAGER NO. ";I;" ?": INPUT
AZ
721  IF AZ < 0 THEN 720
722  IF AZ > F(I) OR AZ > 1000 THEN
730
723  IF AZ = 0 AND B(I) <  > 0 THEN
 RETURN
724  IF AZ < B(I) THEN 780
725  IF AZ = 0 AND B(I) = 0 THEN
750
726 B(I) = AZ: RETURN
730  PRINT "YOU CAN'T WAGER THAT
MUCH, TURKEY!": PRINT "TRY A
GAIN"
732  GOSUB 990
734  GOTO 720
750  INPUT "DO YOU WISH TO QUIT?"
;A$
751  IF A$ <  > N$ AND A$ <  > Y$
 THEN 750
754  IF A$ = N$ THEN 770
756 F(I) =  - 1
758  RETURN
770  PRINT "YOU MUST PLACE A BET
OR QUIT!"
772  GOTO 720
780  PRINT "YOU CAN'T DECREASE YO
UR BET!"
782  GOSUB 990
784  GOTO 720
990  FOR SS = 1 TO 300: NEXT SS
992  RETURN
996  REM  NOW BEGIN PLAY SET UP O
PTIONS ON LIES  BRANCH TO GE
T NUMBER OF PLAYERS
1000 P0 = 0
1001  TEXT : HOME
1005 NG = 1
1010  VTAB 2: HTAB 14: PRINT "GAM
E OPTIONS"
1012  VTAB 6: PRINT " 1";: HTAB 5
: PRINT "STRAIGHT UP GAME (I
 DON'T LIE)"
1014  VTAB 8: PRINT " 2";: HTAB 5
: PRINT "'RUSSIAN ROULETTE'(
I LIE TO YOU)"
1016  VTAB 10: PRINT " 3";: HTAB
5: PRINT "LIKE NO. 2, BUT I
TELL YOU WHEN": VTAB 11: HTAB
7: PRINT " I AM DEALING A BO
GUS NUMBER"
1020  VTAB 18: PRINT "IF THIS ISN
'T CLEAR,SEE THE INSTRUCTION
S"
1022  VTAB 21: INPUT "WHICH? ";W
1024  IF W > 3 OR W < 1 THEN 1022

1026  HOME : GOTO 1100
1030  POKE 34,0: POKE 35,16: HOME

1032  VTAB 2: PRINT "  HOW MANY S
LIPS OF PAPER DO YOU WISH TO
  PICK FROM? (MAX = 14)"
1033  VTAB 5: INPUT NP: IF NP < 2
 OR NP > 14 THEN 1033
1040 Z =  RND (1):MX =  - 1:IM =
15
1042  FOR I = 1 TO NP:X =  RND (2
)
1044 Y =  INT (38 *  RND (3) *  RND
(4)):S(I) = X * (10 ^ Y)
1045  IF S(I) < MX THEN 1047
1046 IM = I:MX = S(I)
1047  NEXT I
```

SIMUTEK PRESENTS

★ TRS-80 ★

.....GAMES.....

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★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE ONE** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

GRAPHIC-TREK "2000" — This full graphics, real time game is full of fast, exciting action! Exploding photon torpedoes and phasers fill the screen! You must actually navigate the enterprise to dock with the giant space stations as well as to avoid klingon torpedoes! Has shields, galactic memory readout, damage reports, long range sensors, etc! Has 3 levels for beginning, average, or expert players! ★ **INVASION WORG** — Time: 3099, Place: Earth's Solar System Mission: As general of Earth's forces, your job is to stop the Worg invasion and destroy their outposts on Mars, Venus, Saturn, Neptune, etc! Earth's Forces: Androids — Space Fighters — Lazer Cannon — Neutrino Blasters! Worg Forces: Robots — Saucers — Disintegrators — Proton Destroyers! Multi level game lets you advance to a more complicated game as you get better! ★ **STAR WARS** — Manuever your space fighter deep into the nucleus of the Death Star! Drop your bomb, then escape via the only exit. This graphics game is really fun! May the Force be with you! ★ **SPACE TARGET** — Shoot at enemy Ships with your missiles. If they eject in a parachute, capture them — or if you're cruel, destroy them! Full graphics, real time game! ★ **SAUCERS** — This fast action graphics game has a time limit! Can you be the commander to win the distinguished cross! Requires split second timing to win! Watch out!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE TWO** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

CHECKERS 2.1 — Finally! A checkers program that will challenge everyone! Expert as well as amateur! Uses 3-ply tree search to find best possible move. Picks randomly between equal moves to assure you of never having identical games. ★ **POKER FACE** — The computer uses psychology as well as logic to try and beat you at poker. Cards are displayed using TRS-80's full graphics. Computer raises, calls, and sometimes even folds! Great practice for your Saturday night poker match! (Plays 5 card draw). ★ **PSYCHIC** — Tell the computer a little about yourself and he'll predict things about you, you won't believe! A real mind bender! Great amusement for parties. ★ **TANGLE MANIA** — Try and force your opponent into an immobile position. But watch out, they're doing the same to you! This graphics game is for 2 people and has been used to end stupid arguments. (And occasionally starts them!) ★ **WORD SCRAMBLE** — This game is for two or more people. One person inputs a word to the computer while the others look away. The computer scrambles the word, then keeps track of wrong guesses.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE THREE** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

POETRY — This program lets you choose the subject as well as the mood of the poem you want. You give TRS-80 certain nouns or names, then the mood, and it does the rest! It has a 1000-word + vocabulary of nouns, verbs, adjectives and adverbs! ★ **ELECTRIC ARTIST** — Manual: draw, erase, move as well as, Auto: draw, erase and move. Uses graphics bits not bytes. Saves drawing on tape or disk! ★ **GALACTIC BATTLE** — The Swineus enemy have long range phasers but cannot travel at warp speed! You can, but only have short range phasers! Can you blitzkrieg the enemy without getting destroyed! Full graphics — real time! ★ **WORD MANIA** — Can you guess the computer's words using your human intuitive and logical abilities? You'll need to, to beat the computer! ★ **AIR COMMAND** — Battle the Kamikaze pilots. Requires split second timing. This is a FAST action arcade game.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE FOUR** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

LIFE — This Z-80 machine language program uses full graphics! Over 100 generations per minute make it truly animated! You make your starting pattern, the computer does the rest! Program can be stopped and changes made! Watch it grow! ★ **SPACE LANDER** — This full graphics simulator lets you pick what planet, asteroid or moon you wish to land on! Has 3 skill levels that make it fun for everyone. ★ **GREED II** — Multi-level game is fun and challenging! Beat the computer at this dice game using your knowledge of odds and luck! Computer keeps track of his winnings and yours. Quick fast action. This game is not easy! ★ **THE PHARAOH** — Rule the ancient city of Alexandria! Buy or sell land. Keep your people from revolting! Stop the rampaging rats. Requires a true political personality to become good! ★ **ROBOT HUNTER** — A group of renegade robots have escaped and are spotted in an old ghost town on Mars! Your job as "Robot Hunter" is to destroy the pirate machines before they kill any more settlers! Exciting! Challenging! Full graphics!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE FIVE** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

SUPER HORSERACE — Make your bets just like at the real racetrack! 8 horses race in this spectacular graphic display! Up to 9 people can play! Uses real odds but has that element of chance you see in real life! Keeps track of everyone's winnings and losses. This is one of the few computer simulations that can actually get a room of people cheering! ★ **MAZE MOUSE** — The mouse with a mind! The computer generates random mazes of whatever size you specify, then searches for a way out! The second time, he'll always go fastest route! A true display of artificial intelligence! Full graphics, mazes & mouses! ★ **AMOEBA KILLER** — You command a one man submarine that has been shrunken to the size of bacteria in this exciting graphic adventure! Injected into the president's bloodstream, your mission is to destroy the deadly amoeba infection ravaging his body! ★ **LOGIC** — This popular game is based on Mastermind but utilizes tactics that make it more exciting and challenging — has 2 levels of play to make it fun for everyone. ★ **SUBMARINER** — Shoot torpedoes at the enemy ships to get points. Fast action graphics, arcade type game is exciting and fun for everybody!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE SIX** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

20 HOME FINANCIAL PROGRAMS — Figures amortization, annuities, depreciation rates, interest tables, earned interest on savings and much, much more. These programs will get used again and again. A must for the conscientious, inflation minded person.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ **PACKAGE SEVEN** ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

BACKGAMMON 5.0 — 2 different skill levels make this game a challenge to average or advanced players. (Not recommended for beginners). Looks for best possible move to beat you! FANTASTIC GRAPHICS. Plays doubles and uses international rules. ★ **SPEED READING** — Increases your reading speed. Also checks for comprehension of material. Great for teenagers and adults to improve reading skills. ★ **PT 109** — Drop depth charges on moving subs. Lower depths get higher points in this fast action graphics game. ★ **YAHTZEE** — Play Yahtzee with the computer. This popular game is even more fun and challenging against a TRS-80! ★ **WALL STREET** — Can you turn your $50,000 into a million dollars? That's the object of this great game. Simulates an actual stock market!

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```
1048  IF W = 1 THEN  RETURN
1050 L =  RND (4): IF L < .1 THEN
1050
1052 L = 100 * L:ZZ =  INT ((L /
NP -  INT (L / NP)) * NP + .
05):L = ZZ
1054 TE = S(L):X =  RND (2):Y =  INT
(38 *  RND (5) *  RND (6))
1056 S(L) = X * (10 ^ Y)
1060  RETURN
1098  REM  GET THE NUMBER OF PLAY
ERS
1099  REM  THEN INITIALIZE FUNDS.
 THEN HOW MANY STRIPS, THEN
TAKE BETS (CONVOLUTED, BUT I
T WORKS)
1100  VTAB 10: INPUT "HOW MANY PL
AYERS? (1 TO 4) ";PM
1101  IF PM < 1 OR PM > 4 THEN 11
00
1102  IF PM = P0 THEN 1111
1103  IF P0 = 0 THEN 1109
1104  FOR I = PM TO P0: GOSUB 600
: NEXT I
1106 P0 = PM: GOTO 1111
1109 P0 = PM
1110  FOR I = 1 TO PM: GOSUB 600:
 NEXT I
1111  GOSUB 650: GOSUB 1030: GOSUB
100
1112  FOR I = 1 TO PM: GOSUB 700:
 NEXT I
1115  GOSUB 650
1119  REM  INITIALIZE CHOICE MEMO
RY
1120  FOR I = 1 TO PM:CH(I) = 0: NEXT
I
1130 WS = 0
1198  REM  THIS SECTION PRINTS OU
T THE DISPLAY FOR APPLE VIDE
O. STRIPS ARE WHITE BLOCKS (
INVERSE BLANKS)
1200  TEXT : HOME
1202 N = 0:PP = 0
1204  FOR J = 1 TO 14 STEP 2
1206  VTAB J: HTAB 1: FOR K = 1 TO
2
1207  NORMAL : PRINT "  ";: INVERSE
: PRINT "                ";
1208 N = N + 1: IF N = NP THEN 12
10
1209  NEXT K
1210 PQ = J + 1: FOR K = J TO PQ:
 VTAB J:PS = 38 * (K - J)
1212  IF PS = 0 THEN PS = 1
1214  NORMAL : HTAB PS: PRINT K: IF
K = NP THEN 1220
1216  NEXT K
1218  NEXT J
1220  NORMAL
1222  POKE 34,17: POKE 35,19
1229  REM  DISPLAY BETS AND TOTAL
S
1230  GOSUB 100
1250  POKE 34,20: POKE 35,23
1252  HOME : VTAB 21
1254  PRINT "WHICH STRIP DO YOU W
ISH TO SEE";: INPUT ST
1255  IF ST > NP THEN 1252
1256  GOSUB 200: IF XP = NP THEN
1290
1257  IF ERR = 1 THEN 1252
1258  GOSUB 300
1260  IF WS = PM THEN 1300
1261  REM  WS=PM MEANS ALL PLAYER
S HAVE CHOSEN
1265  GOSUB 212
1269  REM  CHANGE BETS?
1270  FOR I = 1 TO PM
1272  GOSUB 700
1275  NEXT I
1277  GOSUB 650
1280  GOTO 1230
1288  REM  OKAY ALL STRIPS HAVE B
EEN SHOWN. IF NO CHOICE HAS
BEEN MADE, THEN THE CHOICE M
UST BE THE REMAINING STRIP
1290  FOR I = 1 TO PM: IF CH(I) <
 > 0 THEN 1296
1292 CH(I) = ST
1296  NEXT I
1298  REM  ALL BETS ARE IN, PRINT
 OUT THE REAL VALUES FOR ALL
 THE STRIPS, FLASH THE LARGE
ST
1300  POKE 34,20: POKE 35,23: HOME

1301  VTAB 20
1302  PRINT "ALL BETS ARE NOW IN"

1303  GOSUB 230
1304  POKE 34,0: POKE 35,15
1306  FOR ST = 1 TO NP
1308  GOSUB 201
1309 S(ST) =  ABS (S(ST))
1310  IF S(ST) <  > MX THEN 1320
1312  VTAB R * 2 - 1:PS = 22 * (C
L - 1): IF PS = 0 THEN PS =
4
1314  HTAB PS: FLASH : PRINT S(ST
)
1320  NEXT ST
1330 : POKE 34,20: POKE 35,23
1331  HOME : VTAB 20
1332  PRINT "THE CORRECT NUMBER W
AS ";MX;" !"
1339  REM  SETTLE THE BETS
1340  GOSUB 400
1342 XP = 0
1345  PRINT H$;: INPUT A$
1350  TEXT : HOME
1354  VTAB 10: INPUT "DO YOU WISH
 TO CHANGE GAME OPTION?";A$
1356  IF A$ <  > N$ AND A$ <  > Y
$ THEN 1354
1358  IF A$ = Y$ THEN 1005
1360  VTAB 12: INPUT "DO YOU WANT
 TO CHANGE THE NUMBER OF PLA
YERS?";A$
1362  IF A$ <  > N$ AND A$ <  > Y
$ THEN 1360
1364  IF A$ = Y$ THEN 1100
1366  HOME
1368  GOSUB 100
1370  GOTO 1111
1372  REM
1374  REM  LOOP THROUGH THE PROGR
AM
1376  REM
1400  REM  PRINT HEADER FOR PROGR
AM, ASK IF INSTRUCTIONS ARE
NEEDED
1500  REM
3000  VTAB 8: HTAB 17: PRINT "10^
38": VTAB 10: HTAB 8: PRINT
"(TEN TO THE THIRTY-EIGHTH)"
: VTAB 12: HTAB 5: PRINT "A
BETTING GAME FOR THE APPLE I
I"
3002  VTAB 16: HTAB 6: PRINT "PRO
GRAMMED BY L. W. BRADFORD"
3004  VTAB 22: INPUT "DO YOU WANT
 INSTRUCTIONS? (Y/N)";A$
3005  IF A$ <  > Y$ AND A$ <  > N
$ THEN 3006
3006  IF A$ = N$ THEN 1000
4000  TEXT : HOME
4001 H$ = "HIT RETURN TO CONTINUE
"
4002  PRINT "10^38 IS BASED ON 'G
OOGOL', A GAME THAT IS DESCR
IBED BY MARTIN GARDNER IN HI
S  BOOK 'NEW MATHEMATICAL D
IVERSIONS FROM  SCIENTIFIC A
MERICAN'."
4003  PRINT : PRINT
4004  PRINT "THE GAME WAS ORIGINA
TED BY JOHN H. FOX  AND L. G
ERALD MARNIE, IN 1958."
4005  PRINT
4006  PRINT : PRINT "THE GAME DES
CRIBED HERE IS ESSENTIALLY
THE SAME, BUT WITH SOME 'TWI
STS' TO IT."
4008  PRINT : PRINT "A GOOGOL IS
10 MULTIPLIED BY ITSELF 100
TIMES.  THE ORIGINAL GAME HA
D THAT  VALUE AS AN UPPE
R LIMIT."
4009  PRINT "THE LIMIT FOR THIS G
AME IS 10^38, WHICH EXPLAINS
 THE NAME"
4010  VTAB 22: PRINT H$;: INPUT A
$
4020  HOME : PRINT "THE BASIC GAM
E IS PLAYED AS FOLLOWS;": PRINT
"THE PROGRAM PICKS SOME RAND
OM POSITIVE"
4022  PRINT "NUMBERS (FROM 0 TO A
BOUT 10^38).": PRINT "THE NU
MBERS ARE WRITTEN ON THE BAC
K OF": PRINT "SOME STRIPS OF
 PAPER."
4023  PRINT
4024  PRINT : PRINT "THE NUMBER O
F STRIPS OF PAPER TO BE USED
 IS UP TO YOU.": PRINT "BUT
YOU MUST CHOOSE AT LEAST 3 A
ND NOT  MORE THAN 14."
4026  PRINT : PRINT "WHEN YOU SEL
ECT A STRIP, IT WILL BE
'TURNED OVER' TO DISPLAY THE
 NUMBER."
4028  VTAB 22: PRINT H$;: INPUT A
$
4040  HOME : PRINT "THE GAME IS P
LAYED BY TURNING THE STRIPS
OVER ONE AT A TIME";: PRINT
" UNTIL YOU COME"
4042  PRINT "TO THE STRIP WHICH Y
OU GUESS TO BE THE  LARGEST
 OF THE BUNCH."
4044  PRINT : PRINT "YOU MUST TAK
E THE LAST STRIP YOU TURNED
 OVER, YOU CAN'T GO BACK TO
ANOTHER."
4046  PRINT "FROM ONE TO FOUR PEO
PLE MAY PLAY AT ANY  ONE TIM
E.": PRINT : PRINT "PLAYERS
MAKE BETSON THEIR OWN CHOICE
S."
4048  PRINT "IF A PLAYER MAKES A
CHOICE,THE OTHERS  MAY CONT
INUE SEARCHING.": PRINT "BET
TING CONTINUES UNTIL ALL PLA
YERS  HAVE CHOSEN"
4050  PRINT : PRINT "TO HOLD AT A
 PARTICULAR BET, ENTER A
ZERO FOR THE BET.": PRINT "Y
OU MUST,HOWEVER, MAKE SOME B
ET OF AT"
4052  PRINT "LEAST $1.00"
4058  VTAB 22: PRINT H$;: INPUT A
$
4060  HOME : VTAB 2: PRINT "TO TH
ROW A LITTLE CONFUSION INTO
MATTERS TTHE COMPUTER CAN LI
E TO YOU."
4062  PRINT : PRINT "TWO OPTIONS
ARE PROVIDED TO THE BASIC  G
AME.": PRINT "IN THE FIRST O
PTION, THE COMPUTER WON'T TE
LL YOU"
4064  PRINT : PRINT "THE SECOND O
PTION IS NOT FOR THE FAINT
OF HEART.": PRINT "THE COMPU
TER WILL TELL YOU IF IT HAS
  LIED ABOUT THE LAST NUMB
ER."
4066  PRINT : PRINT "SO, IF YOU'V
E JUST BET ON IT, YOU MAY
LOSE OR YOU MAY WIN BUT YOU
WON'T BE  SURE"
4068  PRINT "BUT THEN NEITHER WIL
L ANYBODY ELSE."
4070  VTAB 22: PRINT H$;: INPUT A
$
4072  HOME : VTAB 3: PRINT "THE R
EAL CHALLENGE OF THE GAME IS
 TO  FIND A WAY TO OPTIMIZ
E YOUR  BETTING."
4074  PRINT : PRINT "MARTIN GARDN
ER DISCUSSES THE STRATEGY
FOR THE NORMAL GAME IN HIS B
OOK,"
4076  PRINT : PRINT "  'NEW MATH
EMATICAL DIVERSIONS FROM': PRINT
"  SCIENTIFIC AMERICAN"

4078  PRINT : PRINT "THE ANALYSIS
 OF THE SITUATIONS WHERE THE
 COMPUTER LIES TO YOU IS LEF
T TO THE  INTERESTED READE
R."
4080  VTAB 20: INPUT "HIT RETURN
TO START PLAY";A$
9000  TEXT : HOME
9100  GOTO 1000
9999  END
```

YORN

David Gerrold

So there I was, showing off my North Star to some friends who were thinking about getting a machine of their own, and suddenly, the attractive redhead asked, "If it's so smart, how come I have to type in a '1' or a '2' for 'yes' or 'no'?"

"Um — " I said. "That's just the way the program was written. I copied it out of **Creative Computing.** The author was probably trying to save memory, so he didn't bother putting in a recognition subroutine."

"But it's possible?" she asked.

"Sure," I said. "It's probably very easy. In fact, they encourage you to personalize the programs to your own uses."

"So, why haven't you?" she asked.

She had me there. I said, "Because I hadn't recognized a need to . . . ?"

"Well, it would be nice," she sniffed. And I knew what that sniff meant.

All right. I'd show her.

After they left, I sat down at the machine and constructed the following all-purpose "Y" or "N" subroutine to patch into various game programs.

I call it Yorn, and it's written in North Star Basic.

Whenever a "yorn" is needed, have your program print the question, then jump to the Yorn subroutine. It will then return a 1 or a -1.

The subroutine will recognize any variation of yes or no that begins with the same letters: **Yeah** or **Yup** or **Nein** or **Nyet.** For some reason, this impresses people who don't realize exactly what the program is recognizing.

I chose to use the positive and negative values, because it appeals to my sense of symmetry. Also, the value can be inverted by multiplying by -1. This could be convenient for some applications.

If the user puts in anything but a yes-or-no answer, the subroutine prompts him (line 1100) to answer properly and then starts over. You can't get out of the subroutine unless you answer with a yes or a no.

If you want to be more versatile, you can add:

1085 DATA "AFFIRM",1,"ALL RIGHT",1,"SURE",1,"OK",1

— or any other affirmatives or negatives, you want recognized.

My redheaded friend was suitably impressed when Yorn responded to her "Yassuh" and her "Naw" — but then, she looked up at me and asked, "How come it always prints out at the edge of the page? Can't you center it?"

But that's another subroutine. □

David Gerrold, P.O. Box 1190, Hollywood, CA 90028.

```
1010REM ----------------------------------YORN
1020INPUT I$
1030RESTORE 1080
1040READ A$,Z\IF A$="ZZZ" THEN 1060\A=LEN(A$)
1050IF I$(1,A)<>A$ THEN 1040
1060ON ABS(Z) GOTO 1070,1100
1070RETURN
1080DATA"Y",1,"y",1,"N",-1,"n",-1
1090DATA"ZZZ",2
1100PRINT"'Yes' or 'no', please."
1110GOTO1020
READY
```

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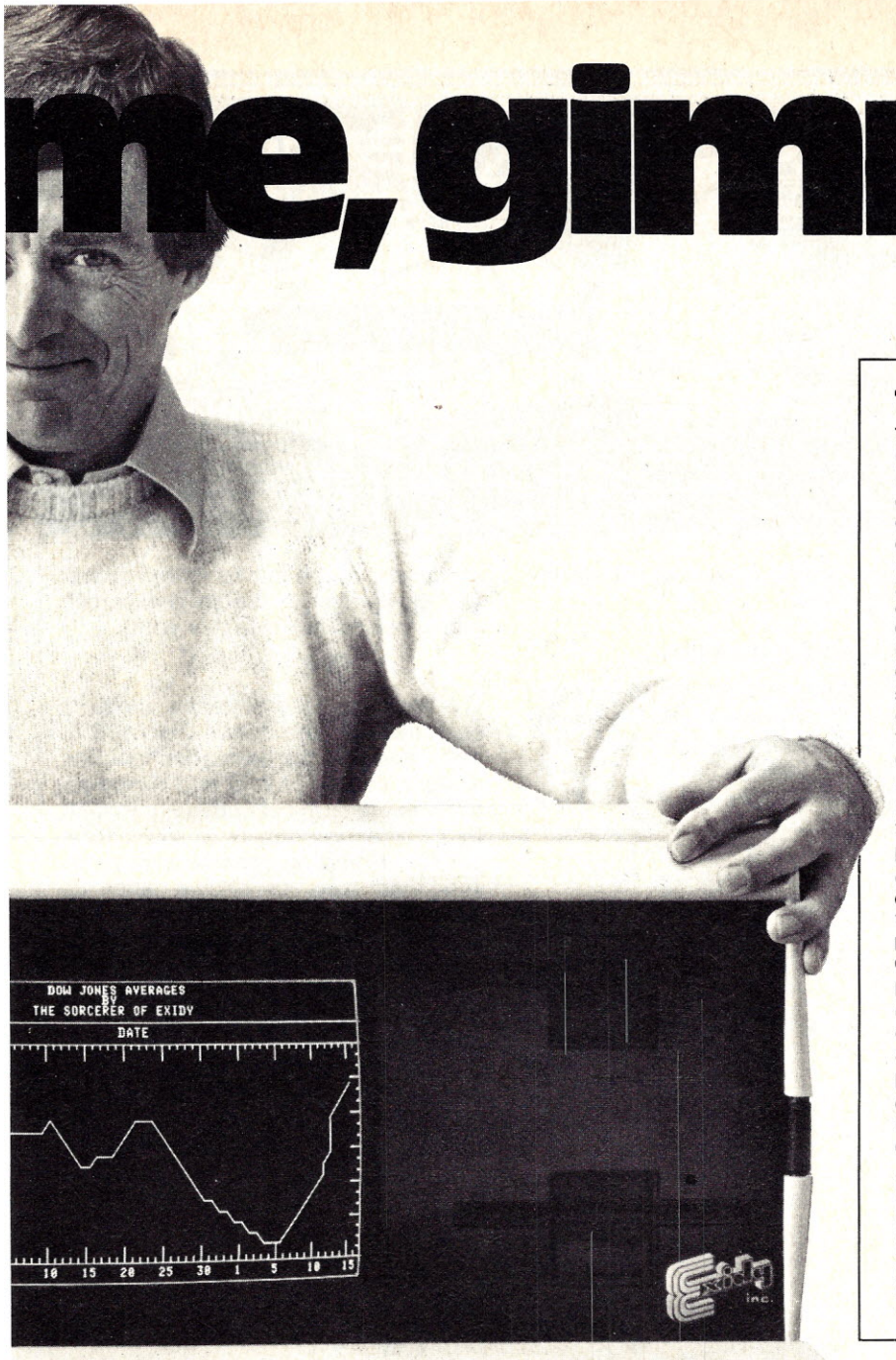
me, gimme."



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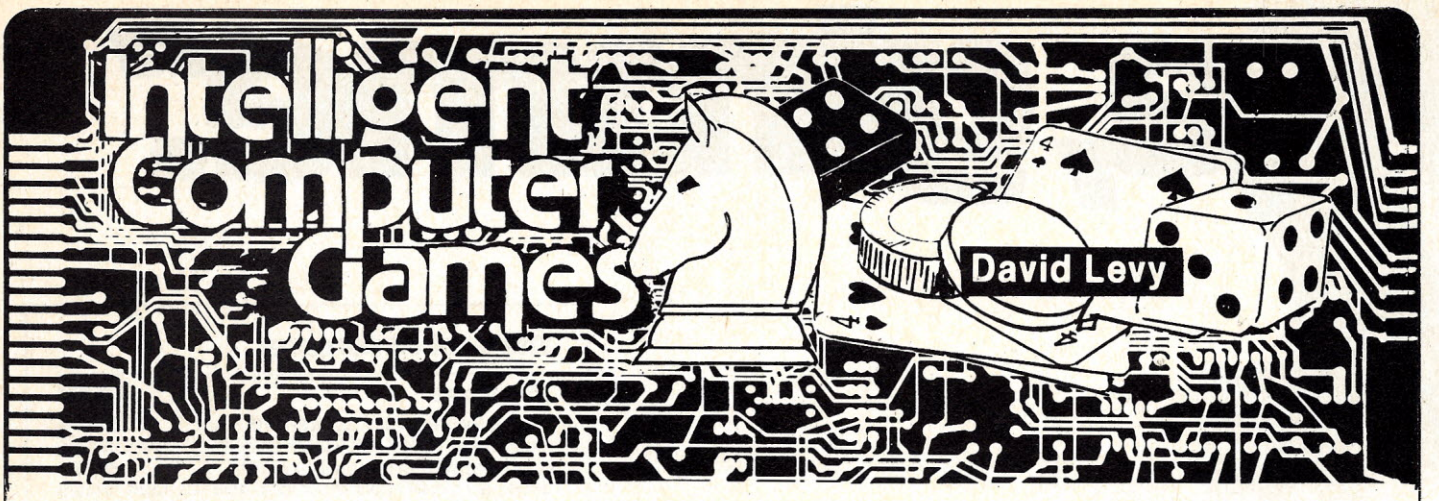

Correspondence is welcome. Letters with interesting questions and ideas will be used in the column along with a response. No personal replies can be made. Send to: David Levy, 104 Hamilton Terrace, London NW8 9UP, England

Games with Big Trees

Last month we discussed the use of the minimax method to search game trees, using noughts and crosses (tic-tac-toe) as our example. This is a game with sufficient symmetry to reduce the number of essentially different moves at the start to three: the center, a corner, or the middle of an edge. At the second ply there are a total of 12 essentially different positions, so with only seven spaces then remaining there will be an upper bound of 12 x 7 on the total number of terminal positions in the whole of the game tree. In practice the total will be somewhat less than this figure, since a number of paths will lead to a win for one side or the other, or a draw (i.e. a position in which every row, column and diagonal has at least one "O" and one "X" in it), before all nine elements of the 3×3 array have been filled. In order to play a perfect game of noughts and crosses with the crudest of evaluation functions, we could search the game tree exhaustively, using a score of +1 for a variation won by the program, -1 for a variation won by the opponent, and 0 for a draw.

Most interesting two-person games have much larger trees than this: in chess there are roughly one million terminal positions in an average 4-ply search, in Go the figure would be ten thousand million for a 4-ply search at the start of the game. How can we cope with such gigantic combinatorial growth in our game trees? The answer lies in a refinement of the minimax method known as the alpha-beta algorithm.

The Alpha-Beta Algorithm

The alpha-beta algorithm owes its power to the argument that if a player can choose from a number of moves, once he finds one move which serves his purpose he need not examine the remainder of the moves in that group. Let us look at a simple two-person game tree to illustrate this point.

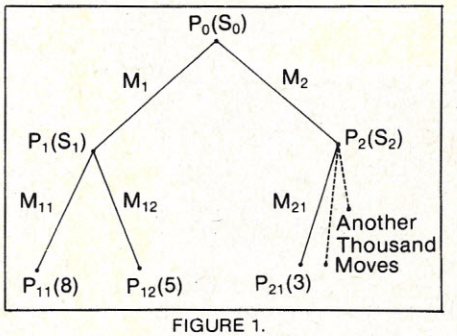

FIGURE 1.

(See Figure 1)

We shall assume that a program searches the above tree from left to right, and that the evaluation function assigns scores of 8, 5 and 3 respectively to the terminal nodes P_{11}, P_{12} and P_{21}. If the program is to move from position P_0, it first considers move m_1 and then tries to decide what its opponent will do from position P_1. The opponent may choose between scores of 8 and 5, and since we have adopted the convention that the opponent's target is a low score, the opponent will choose position P_{12} with a score of 5.

The program now knows that if it chooses m_1, its opponent can prevent it from achieving a score of more than 5. This value of 5 is therefore the value

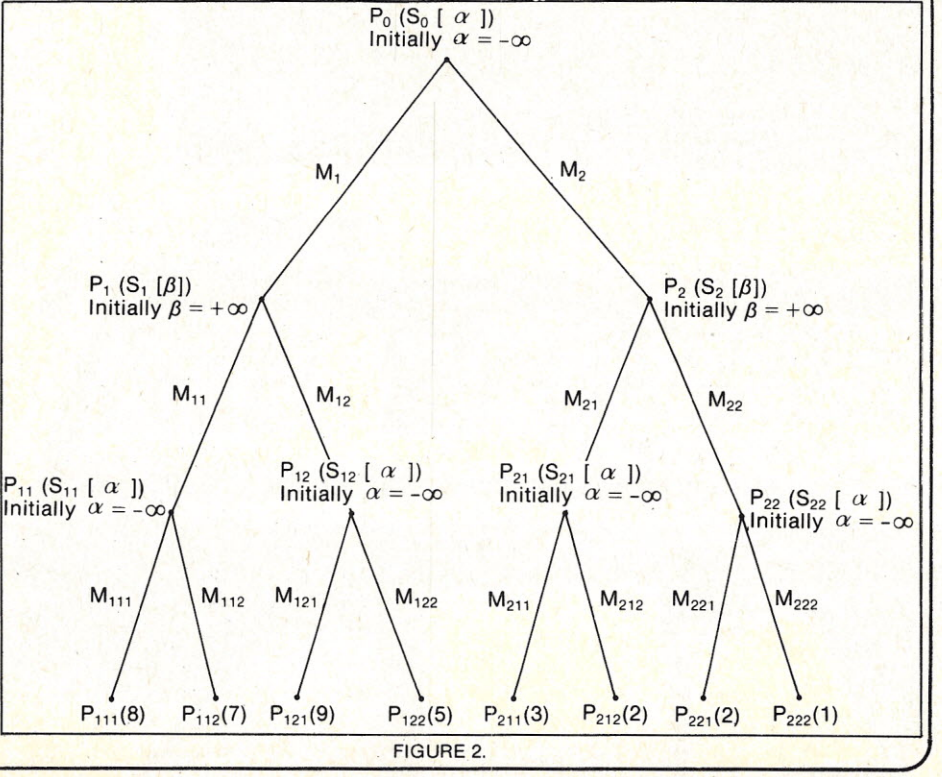

FIGURE 2.

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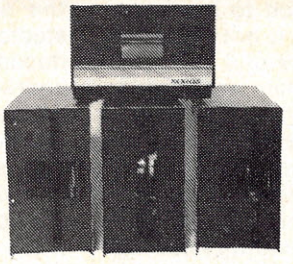

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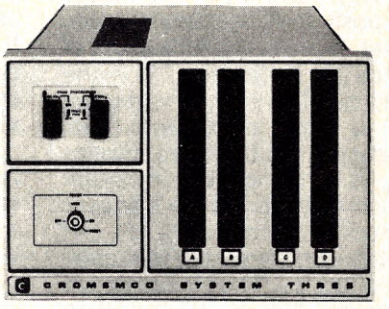

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of position P_1, assuming correct play by the opponent, and so the value 5 is assigned to S_1. We call this process of assigning values as the program backtracks up the tree "backing-up."

The score at S_1 is now backed up to S_0 and the program then considers position P_2, to determine whether it will prefer to play move m_1 or m_2. It sees that from position P_2 its opponent can, if he wishes, move to P_{21} for a score of 3, and since 3 is better than 5 from the opponent's point of view, the program will wish to deny its opponent this option and it will not, therefore, choose move m_2. It is completely irrelevant what the scores are for the thousands of unexamined brother nodes, $P_{2,2}, P_{2,3}, \ldots P_{2,1001}$, because the move m_{21} is already known to refute m_2. Thus the program has determined that m_1 is better than m_2, even though it has examined only 3 of the 1,002 terminal nodes on the tree!

Of course this particular example has been specifically designed to sell you the alpha-beta algorithm, and most game trees do not allow us to get away so lightly, but the savings achieved with this algorithm are certainly substantial enough to make alpha-beta an almost essential segment in any program that searches two person-game trees. The algorithm always chooses the same move that would be selected by the minimax algorithm, but usually in a fraction of the time.

Since alpha-beta is so important in game playing, I make no apologies for including another, more complex example. This will show how the method works for a 3-ply tree and will illustrate why it has been given its strange name.

(See Figure 2)

Initially, all non-terminal nodes at even ply are assigned the value $-\infty$ (α). All non-terminal nodes at odd ply are assigned the value $+\infty$ (β). As usual it is the program's turn to move from the root position P_0, and the program is trying to maximize the value of α. The opponent moves from positions P_1 and P_2, trying to minimize the value of β. The program moves from the positions at ply-2 (P_{11}, P_{12}, P_{21} and P_{22}), trying to maximize α.

The tree search now proceeds as follows:

1. Examine P_{111}. The score of 8 is greater than $-\infty$ so α at S_{11} is set to 8. This score is then compared with β at S_1 and found to be less than $+\infty$, so this value of β is also set to 8. In order to decide whether the program might be willing to play m_1, this score of 8 at S_1 is compared with $-\infty$ at S_0 and found to be greater, so α at S_0 is set to 8.

2. Examine P_{112}. The score of 7 is less than α at S_{11}, which is now 8, and since it is intended to maximize α, the value of α at S_{11} is not adjusted, and therefore the value of β at S_1 and that of α at S_0 also remain unchanged.

3. Examine P_{121}. The score of 9 is greater than $-\infty$, so α at S_{12} is set to 9. This score is then compared with β at S_1 and found to be greater, and since it is intended to minimize β the program can reject move m_{12}, knowing that its opponent can do better with move m_{11}.

4. The left hand side of the tree has now been examined and the search proceeds to the comparison of the best score achieved so far (8) with whatever can be reached, assuming best play by both sides, if the program should choose m_2. This part of the search commences with an examination of P_{211}, which is found to have a score of 3. This is compared with α at S_{21} and found to be greater, and since it is intended to maximize α the program will set this value of α to 3.

5. Examine P_{212}. The score of 2 is less than 3, so α at S_{21} (currently 3) is left unchanged, since it is intended to maximize α. This score of 3 is then compared with β at S_2, found to be lower, and since it is intended to minimize β this value of β at S_2 is set to 3. Finally this value of 3 is compared with α at S_0 (currently 8) and found to be lower. Since it is intended to maximize α, the program already knows that m_2 is inferior to m_1, because playing m_2 is not consistent with maximizing α.

The search is now over and it can be seen that only five of the eight terminal nodes needed to be examined. If you wish to verify the validity of this process by practical means, try assigning different sets of values to positions P_{122}, P_{221} and P_{222}, and you will always find that the program prefers move m_1 to move m_2.

How Powerful is the Alpha-Beta Algorithm?

During the past few years there has been considerable research into the question of just how big are the savings achieved using this algorithm rather than simple minimax. A full discussion of the theoretical and practical results of this research is well beyond the scope of this series, but the studious reader will find this work well documented in the bibliographic references found at the conclusion of this article. What follows is a summary of the most important results, and a brief discussion of their significance.

Monroe Newborn has investigated the power of the alpha-beta algorithm when searching game trees in which the moves within any group are examined in a random order. The following table shows, for various branching factors (b), the number of terminal nodes which we would expect a program to examine, using alpha-beta, in searches of 2 and 3-ply.

	2-ply search		3-ply search	
b	total terminal nodes	expectation	total terminal nodes	expectation
2	4	3.67	8	6.84
4	16	12.14	64	40.11
8	64	38.65	512	220.37
16	256	122.11	4096	1214.45

TABLE 1.

It will be seen that as the branching factor increases, so the proportion of nodes that can be ignored thanks to the alpha-beta algorithm also increases. And as the depth of search increases the effect of the algorithm is again increased. So the bigger the tree becomes, the greater will be the savings using the alpha-beta method.

The savings become even more dramatic when the branches of the tree are examined in an intelligent order. In general it is true to say that within any group of moves the best one should be examined first, so that if the best one is not good enough we need not waste time in examining the second best, third best and inferior moves. If the tree is searched in such a way that the moves are examined in their optimal order, then the number of terminal nodes examined will be approximately $2 \times N$, where N is the total number of terminal nodes on the tree. Thus, for a game of chess in which the branching factor is typically 36, the number of terminal nodes on the tree is 36^4 for a 4-ply tree. Yet by using the alpha-beta algorithm, if the tree is optimally ordered we need examine only 2×36^2 terminal nodes before we find the best move from the root of the tree, a saving of well over 99% when compared with the simple minimax method.

Taking the figures from Newborn's results quoted above, we can compare the expected number of nodes examined with random ordering and the number of nodes examined with optimal ordering.

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b	2-ply search random	2-ply search optimal*	3-ply search random	3-ply search optimal*
2	3.67	3	6.84	5.66
4	12.14	7	40.11	15
8	38.65	15	220.37	44.248
16	122.11	31	1214.45	127

TABLE 2.

I hope that the reader is now convinced that for all two-person game trees, except the smallest of the small, alpha-beta is a must. The most important implication of these results is that if it is at all possible, you should generate and/or examine the moves within any group or family in such a way as to take maximum advantage of the savings that can be achieved, and this means ordering the search in some way. We shall discuss various techniques for speeding up the alpha-beta search in our next month's article, but one obvious method can be mentioned here. First, generate all the moves at the root of the tree, m_1 m_2 . . . etc., and evaluate the resulting positions with the evaluation function. Sort the moves so that the move with the highest score will be examined first, then the move with the next highest, and so on.

Next look at the first position on the list and generate its successor positions. These are assigned scores using the evaluation function and they are then sorted, this time with the lowest scored position coming at the top of the list and the highest scored position at the bottom. (This is because the program's opponent is trying to minimize the score.)

This process is repeated all the way down the tree, except for the terminal nodes, which are not sorted. Now, when searching the tree with the alpha-beta algorithm, the tree will be found to be much nearer an optimally sorted tree than if this process had not been applied. One disadvantage of this method, however, is that it requires us to keep in memory all the successor nodes to each node on the principal variation, apart from the terminal nodes. So in a search of a chess tree, with 36 moves at each node, this method would require us to keep in memory:

a) the root node

b) 36 nodes at each level of look-ahead apart from the terminal node.

In order to combat this problem we might try to find an extremely compact method of representing a position, but if this compactness results in a slowing down of the search process while each position is unravelled or created, much of the effect of the fast alpha-beta algorithm will be lost. Such problems require careful thought and it is often necessary to experiment before the best balance is achieved between representation and optimality of search.

Other useful techniques for examining the moves in a sensible order can often be found by thinking a little about the nature of the game. Let us consider once again the game of noughts and crosses. The elements of the 3×3 array might be numbered as in the following diagram:

1 2 3
4 5 6
7 8 9

A simple way to generate all the legal moves from any position is to look at the elements, starting with 1 and working up to 9, and putting any empty space on the move list. But with a basic knowledge of the strategy of the game we can speed up the search process by looking first at element 5, then 1, 3, 7 and 9, and finally at 2, 4, 6 and 8. This method of move generation takes no longer than 1, 2, 3, 4, . . . 9, yet it enables the alpha-beta algorithm to examine the moves in a more sensible order, thereby taking us closer to an optimal search process.

Next month we shall examine a flow-chart for the alpha-beta algorithm and look at further ideas for speeding up the search process.

Task for the Month

Write a program to play noughts and crosses (tic-tac-toe), taking advantage of symmetry and employing the alpha-beta algorithm. Search the whole game tree using the primitive evaluation function described above (+1 is a win for the program, -1 a win for the opponent and 0 a draw).

Test the program a) when the moves are generated in a random order; and b) when the moves are generated in the order: centre, corners, middle of edges. The results should indicate a useful improvement with ordered search over random search.

Bibliography

Knuth, D.E., and Moore, R.W.: *An Analysis of Alpha-Beta Pruning.* Artificial Intelligence, vol. 6, pp. 293-326, 1975.

Newborn, M.M.: *The Efficiency of the Alpha-Beta Search on Trees with Branch-dependent Terminal Node Scores.* Artificial Intelligence, vol. 8, pp. 137-153, 1977.

Acknowledgement

This program was written on an Apple II computer which was purchased through Grant A0260 from the National Science and Engineering Council of America.

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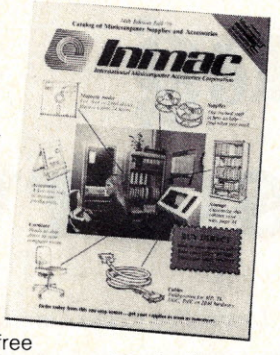

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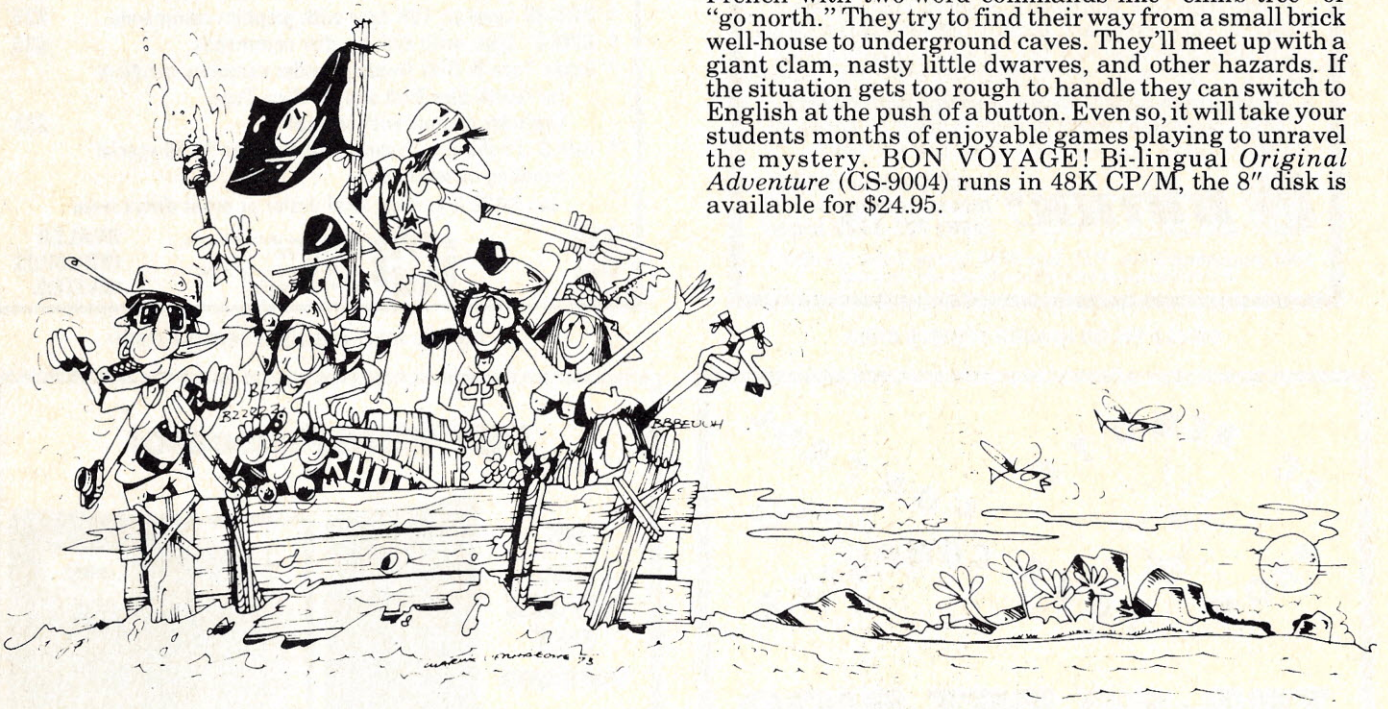

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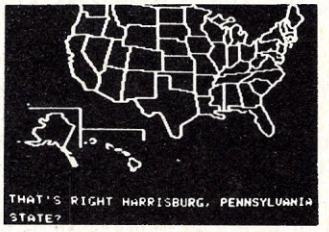

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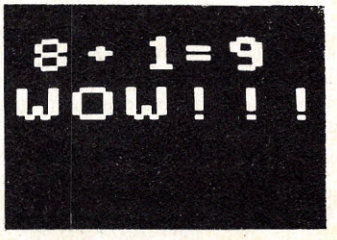

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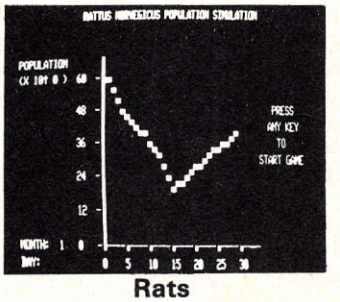

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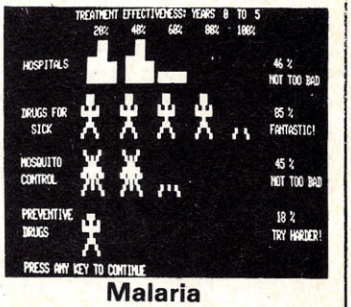

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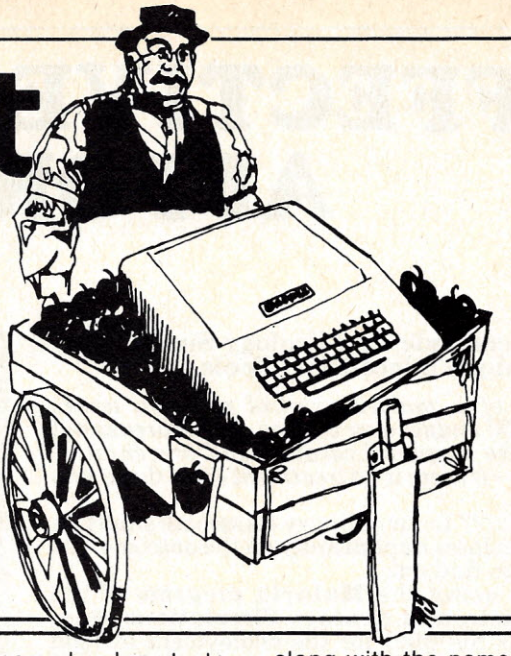

Chuck Carpenter

Correspondence is always welcome and a response will be made to those accompanied by a SASE. Send your letters to: Chuck Carpenter, 2228 Montclair Pl., Carrollton, TX 75006.

Simple File Builder

One of the most useful features associated with the Apple II DOS is the use of files. Files can include anything from a matrix of data as a result of mathematical calculations to a sophisticated Data Base Management System. Listing 1 is an example of a simple file builder and manager. Random access, fixed length files, are used in this example. At this level, sequential files, of fixed length, would have been just as easy to implement. But that's not part of this story.

Most of the elements required to manage a file system are used in this example. Here's what has been included:

- Initialization Routines
- Error Detection Routine
- An Operating System Section
- Building New Files
- Adding New Records
- List Records with Suspension
- Keyword Search
- Record Editing

The initializing and error detecting sections are transparent to the user. The others are included in the operating section as menu options. Other menu selections could include printer selection and control, and sorting. We'll leave these for the future. Let's examine each section of the Simple File Builder and see what it's all about.

Initialize

After clearing the screen with HOME, the program is directed to line 2720 if an error occurs. In one part of the program an error is forced, and used to change the flow of the program. Otherwise, if an error occurs, the program returns to the options menu. If you use control C the effect is the same as an error. The forced error, #5 in line 2720, is an out-of-data error. When a new file is named and you try to read it, this error occurs. There are no records to read. The error is trapped and the program directs you to the Build New Records option. More on this when we get to the Operating System. Other tasks handled in the initialization routine are setting up the control D required to identify DOS commands, dimensioning the number of records (R$) and setting the initial count of the record counter (C).

Line 1110 turns the NOMON controls on. Sometimes it is desirable to see some of the data passing to or from the disk. In this program, I turned everything off. In line 1120, my clock routine is loaded into memory for future use. If there is no routine there, an error will be generated and mess things up. Leave it out or substitute something else here. Lines 1130 to 1160 print a heading and ask for the name of a file. Enter the name of your first file — something like Inventory or Apple II Articles — and press RETURN. The program now passes on through the System Variables listing to the Operating System.

Operating System

The Operating System is a section of the program including an option selection menu and control for directing input requests. Line 1350 CALLs a Mountain Hardware clock output routine. The date and time is available each time the options menu is selected. An error will occur if you try to use this command without a legitimate routine to CALL. In fact, a CALL to nothing in particular will blow the program. Options for the file are printed by lines 1380 to 1430. Existence of a file is checked in lines 1440 through 1480. If the file, named in line 1150, previously existed, then the number of records are posted on the screen along with the name of the file. If the file named is a new file and no records existed, then error #5 is generated.

These lines (1440 - 1480) use DOS commands to make the test for a file. Line 1440 is used to OPEN the file F$ with a length of 40 characters in each record. The contents of record 0 are READ in line 1450 to INPUT the value C, the record count. It is at this point that the OUT OF DATA error, #5, occurs and Build New Records option is selected for a new file. If the MON I,O,C commands were left on at this point, you would see the error displayed on the screen. If there is an existing file, the file is CLOSED in line 1460. The number of records and the name of the file are displayed in line 1470. Input for the option selection is accepted in line 1480 and tested for range in lines 1490 and 1500. Numbers greater than 5 return the program back to the options list again. A zero POKEs the DOS error register back to zero, CLOSEs the file, sets SPEED back to the fastest value, and ENDs the program. Line 1510 sends the program to the program line number corresponding to the file option selected. Branches occur according to the value of S, like this:

S=1, GOTO 1520 - Build the File
S=2, GOTO 1620 - Add Records
S=3, GOTO 1900 - List Records
S=4, GOTO 2110 - Edit a Record
S=5, GOTO 2350 - Keyword Search

Because numbers greater than 5 are trapped and zero stops the program, branching to the requested option is quite reliable.

New and Bigger

Building a new file and adding records options do essentially the same thing. The new file has to start at one and new record adds start at the

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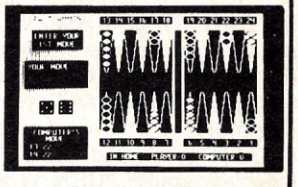

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last record plus one. Otherwise, the file must first be OPENed and prepared for accepting records. Let's start with BUILD FILE and detail the steps used for this segment of the program.

To start the file building process, a short reminder of the option and file name are printed by line 1560. The named file is OPENed in line 1570 for a length of 40 characters. This length was chosen because the output is listed only on the screen. Next, line 1580 uses a control D to halt DOS action. Doing this prevents further program activity from creating garbage in the file. Line 1770 prints the current record number and waits for INPUT. A test for file END is included in line 1780. If the input is END, the program branches to line 1840 and record processing is concluded. Line 1790 makes DOS active again for a WRITE and line 1800 PRINTs (or WRITEs) the record to the DOS buffer. The buffer accepts up to 256 characters and then transfers them automatically to the disk. The buffer contents get transferred to the disk when the file is CLOSEd, too. DOS action is stopped again in line 1810, the record counter is incremented in line 1820 and the program returns for another record at line 1830. This loop continues until the input equals END in line 1780 and the branch to line 1840 is taken.

No new record was added when END was typed. So the counter (C) is decremented and the result printed in line 1840. DOS is again activated and the current record count is written into record zero. Lines 1850 and 1860 do the record count work, and line 1870 CLOSEs the file. In line 1880, a GET command in combination with CHR$(13) is used to exclude all key input except RETURN. When RETURN is pressed, the program returns to the option menu.

Adding records uses two more steps than starting a new file. First, the previous record count is READ in from record zero. Then, the last record entered is READ. This is accomplished in lines 1700 and 1720. The record number and the record are printed in line 1740. Having this information on the screen provides a model for subsequent entries. The record count is incremented in line 1760 and the rest is the same as new record processing.

Listing Records

Up to line 2000, the List program functions are much the same as processing new and added records. Line 2010 starts a loop that lists the contents of the file. A file suspension routine using the WAIT command in combination with a PEEK at the keyboard and a POKE at the keyboard reset is included in line 2020. Each record is INPUT (READ) to the DOS buffer and printed on the screen. When all records are listed, the file is CLOSEd and control is returned to the options menu.

Use of the list option allows scanning the file for one or more records. Speed control is another feature that could be added for listing records. The suspension routine stops and starts the list routine. But, the records still go by quite fast on the screen. Include a line to set the Speed to 125 at the beginning of the listing loop. A header to describe the contents of the file is another possible option. Add a line to put titles on the fields and keep it on the screen with a POKE 34,N.

```
1950 PRINT"DESCRIPTION....COST
     ...DATE PUR"
1955 POKE 34,4
.
.
.
2006 SPEED=125
.
.
.
2096 POKE 34,0 : SPEED=255
```

New line 1955 holds the top of the screen at 4 lines until the listing is completed. Be sure to disable or reset any special controls you use. You'll get some funny results otherwise.

Now, suppose you would also like to add the cost figures in the cost column. The records have been used as one continuous string, so something besides adding simple variables together is needed. In this example program, the cost figures start in column 22 and are 7 characters wide. Add lines to add the figures in these columns like this:

```
2004 LET T=0
.
.
.
2065 LET ST=VAL(MID$(R$,22,7)):
     T=T+ST
.
.
.
2074 PRINT:PRINT TAB (24)"$";
     INT(T*100+.5)/100
```

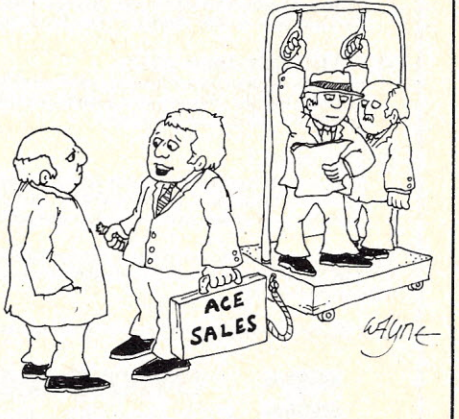
Each time a record is READ, line 2055 extracts the VAL of the cost column as a subtotal (ST) and starts summing the total (T). When the list is complete, the final total is printed with a $ under the cost column. If you change the position of the cost field, be sure to adjust MID$ and Total TAB too.

Edit a Record

To edit a record with this very simple editor, you must know the number of the record(s) to be edited. The technique used **is** quite simple, but effective for short and simple records. After requesting the record number, the file is opened and prepared for reading records. The requested record will be displayed on the screen with the record number. After it's displayed, you get a chance to change it or leave it alone. If the record was the wrong one, just press N and the record is stored back on the disk unchanged. A Y to change the record displays the INPUT prompt (?) on the screen. You can then type in a new line, being careful to follow the exact format. Or, you can use escape D to move the cursor up to the displayed record. Then use the right arrow key to move to the part of the record to be changed. Retype the changes as needed and move the cursor to the end of the line. Press RETURN. The new record will be put on the disk in place of the old one. A bit more sophisticated approach would use VTAB and HTAB to position the INPUT prompt at the beginning of the line to be changed. The step to use escape D to move the cursor is not needed if this is done. After all changes are made, the program returns to the option menu. (Remember, I said it was a simple editor.)

Keyword Search

This routine is useful for finding all the items with the same name or things in the same year or month and so on. For most of the files I am using, I prefer to use a search rather than a sort. For nice ordered lists of things though, a sort is the only way. But, that's a story for another time. Keyword search was described in detail in the January '80 Apple Cart. Most of the detail included opening, reading and closing Apple II DOS files. These details have been covered here too, so on to the meat of the program.



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Apple Cart, cont'd...

After requesting the keyword to be located, the file is OPENed and prepared for READing records. A loop for calling-up each record starts at line 2510. Each record is then scanned, 1 character at a time, for the keyword. If a keyword is found, the record is displayed and a flag is set. The program returns for the next record and continues the search. If no keywords were found, a prompt to look for another keyword is displayed. If records were found containing the keyword, you are also given the option to make changes. The option to search for more keywords is also displayed. Answering No to both of the prompts returns the program to the option menu.

More Zing

Several times during this discussion the simplicity of the program has been emphasized. There are a number of features that would make using file more productive. Each improvement would make the program more confusing and difficult to explain. A program for cataloging magazine articles from Southeastern Software uses a number of clever features. The human factors of using the program were greatly improved by the techniques used. Inclusion of sort routines and more ideas for building records and formatting will be included in future columns.

Basic on Videotape

Videocassettes teaching computer applications and programming fundamentals are now available to businesses and schools. The concept, called Evolution 1 (TM), was created by Dr. Portia Isaacson of Electronic Data Systems (EDS) in Dallas.

Currently available are 4 tapes of interest to potential Apple owners (and other beginning Basic programmers). The videotape presentation, using familiar analogies, makes no assumptions about prior knowledge of computers or programming. Lesson 1 starts with instructions on getting the computer operating. The viewer is then taught to use several Basic programming commands in a refreshing, unhurried manner. By the end of the fourth tape, the viewer has acquired sufficient skill to proceed with confidence, to more advanced challenges. Each tape is accompanied by a study booklet. The booklets are easy to use and effectively reinforce learning through color highlighted text and representations of a video screen. The booklets could be used separately but all the supporting information from the tape presentation would be lost. Additional tapes, teaching more advanced Basic, are planned.

Other videotapes in the Evolution 1 (TM) series include 2 Point Of Sale (POS) tapes and 2 Business application tapes. The POS tapes are designed to support retail sales people with technical information. Business applications illustrate techniques for using a small computer in a small business. Three new lessons are planned for the business series too. The newest entries include an 8 tape series titled 'Little Computers . . . See How They Run.' These tapes describe various microcomputer features and accessories including detail of the microprocessor chip itself.

Tapes are available to computer retailers, distributors, educational people and corporations on a lease basis. The lease rate is $35.00 per month per tape with a 6 tape minimum. Tapes can be mixed in combinations. These tapes can be exchanged during the year for a $40.00 fee. One set of study booklets comes with each tape series. Additional sets cost $10.00 to $20.00 per set.

For more information, call Evolution 1 at 800-527-0278 (in Texas, 214-661-4070), or write them at 14580 Midway Road, Dallas, TX 75234. Also, look for these videocassettes at your local computer store.

Super Invader: A Review

This recreational diversion (sometimes called a game) is addictive. The constant challenge for higher and higher scores closely parallels gambling. Except you have nothing to loose but your sanity.

Super Invaders, by M. Hata, is a real time, interactive high-res graphics program. Graphics implementation is excellent. Animation is included as the invaders flap their way towards destruction of your cannons and your blockade. An invader cheering section adds insult to injury each time one of your laser cannons is destroyed. However, there is some retribution as the cheering section shows remorse when the last invader in each wave is destroyed. A high-flying 'saucer' provides additional scoring as it flies at random across the top of the screen. Space sounds are used to emphasize the affect of laser fire, invader demise and to announce the flight of the saucer. The randomness of various scoring features adds to the challenge of going-for-more.

As of the date this is being written (mid Jan '80), my son has achieved a score of over 5800. My score is somewhat less. Super Invaders has been described as the game that drove Japan crazy. I'm sure you will agree once you've tried it (and tried it and tried it . . .). The game is available from such diverse sources as Creative Computing Software (see add on page 23) and from your local computer store. The cost is $19.95 on tape or diskette.

Data Base Management System

If you're looking for a technically well designed Data Base Management System, try the one from High Technology. The system has many features allowing flexible data base operations. There are also some not-so-good features. This is how I would summarize my evaluation:

- Software Engineering .... Excellent
- Human Factors ..... Poor
- Documentation ..... Marginal

Once set-up, the features and flexibility of the system make it excellent for use with structured data base requirements. For instance, mailing lists, customer records, inventory management and perhaps some types of personal record management. For our application, a structured diskography using 9 files with 4 sorts including 2 secondary and 1 tertiary sort, the system is an excellent choice. A listing of our master file set-up is shown in Figure 1. Let's look at the not-so-good things first and get them out of the way.

Human Factors

The complexity of the set-up requirements precludes use of this system by many people not familiar with programming. Even though the program software is well engineered, the lack of helpful prompts and examples geared to a non-technical target population minimize its usefulness. Correction of errors is clumsy: A RESET and rebooting is the only way you can recover from a processing error (one that sets off an obnoxious siren sound). For an input entry error, you must complete all input for the record, then call the MODIFY option. Once in operation, use is simpler, but there are still a large number of entries required to access the data. Also, there are no easily understood error messages.

Documentation

There are only 23 partially filled pages of documentation in a 3 ring binder. The documentation consists of brief descriptions of each menu option. The descriptions do not include meaningful examples, and little consideration is given to interactions between options. For instance, it is necessary to use option 13 before you

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Fast and quick label generation.
Program diskette and instruction manual $40

INVENTORY PROGRAM

2 disk drive, menu-driven program. Inventory categories include: STOCK#, DESCRIPTION, VENDOR ID, CLASS, LOCATION, REORDER PT, REORDER QTY, COST, SELLING PRICE, # ON ORDER, ORDER DATE, QTY ON HAND. All records can be entered, changed, updated, deleted or viewed. Reports can be sorted in ascending/descending order by any category. 7 search categories (3 automatic). Calculates $ VALUE of inventory and YTD, MTD and period items sold. Accumulates inventory over a 13-month period. Plus much more. Requires a 132-column, serial/parallel printer. Complete turnkey operation with bootstrap diskette.

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The ANA1 two letter user commands are: CA = Calculate, no graph. CG = Clear Graphs, leave Grids. CK = Checking out program, known data. CO = Color of next graph (red, green, violet, white, blue). CS = Clear Screen. DL = Draw Line between points. FI = Filter data for time, magnitude, or percent change. FU = Data, transform, or constant Function with +,-,x,/ operator. GD = Graphic mode, display all Graph Data on screen. GR = Graph data to screen. GS = Set Grid Scale. HE = Help, summary of any commands usage. LD = Load Data from disk file from inputted date to memory. LG = Leave Graphs, automatic Grid rescaling. LO = Look, select a range of the LD data and GR; All commands can now be used on this range. LS = Least squares linear fit of the data. MA = Moving Average of the data. NS = No Scale, next graph on screen does not use Grid Scale. NT = No Trace. PR = User implimented Printer routine. TD = Text mode, display Text Data on screen. TI = Time number to date or vice versa. TR = Trace. TS = Text Stop for number of lines outputted to screen when in TD. U1/U2 = User 1/2 implimented routines. VD = Values of Data outputted in text. VG = Values of Grid; low/high/delta. VT = Values of Transform outputted in text.

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* Software Review in Call-A.P.P.L.E. (2/80): "An example of an excellent piece of software exploiting most of Apple II's major features." Overall Rating = 92.1

* Software Review in Apple Orchard (3/80): "A remarkably flexible approach to the analysis and plotting of any time series data." Overall Rating = 85.7

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Apple Cart, cont'd...

can use option 2. Another shortcoming was the description of 'Literals' in the menu option 7. These turned out to be optional field headings for use with the output formatting set-up. The literals would replace the names of fields used for the print out. In all menu options, it is not apparent what the input limitations are. You are left to your own devices to find out. Some walk-through examples are needed.

One other item. There is no way to know how much space is used or is left on the text file disk. By another method, I found there are about 100K bytes of space on a formatted disk. Our records are 224 bytes long and 250 of them used about 75K. Allow about 10% for the sorting keys, formatting files and other overhead and there was something over 20K left for additions and changes.

The Good Stuff

Part of the confusion when first using this system comes from its complexity. You can do a great many things with this data base. A certain learning experience is needed before you can become comfortable with the system. Here's a list of some of the features included in the 14 menu options:

- Develop a named data base with up to 20 fields, set the size of each field in the record (255 characters per record), and designate whether each field is alpha or numeric. Up to 10 additional field names — called literals — are also allowed.
- Sort on any field number, and any combination of up to 10 sub and sub-sub fields.
- Set-up and change master program parameters to allow for format and data base variations. Options include printer slot, printer type, lines per page, number of printed columns — up to 250, name of file in use and the slot the text file disk is in.
- A variety of options to create and change the data base, enter the data, search for records and other useful housekeeping operations.
- Develop your own format for printing the data. You can include several formats on the text file disk. Another option prints the data base in a mailing list format. Input has to be developed a specific way to use this option. The option to total numbers in any column is also included.
- Initialize a diskette and exit from the system are two more options included in the menu.

When using any DBM system, keep in mind the speed of sorting operations. Even though it is realistic to manage a large amount of data with your Apple II, don't expect to do it very fast. There is not enough RAM memory left to hold more than a few Kbytes of records at a time. Consequently, a lot of swapping takes place between the disk and memory when large files are sorted. In Figure 1, the number of sorts and sub sorts used is 7. We found that sorting 250 records required one-half hour. Once sorted into keyed files however, the data was quickly retrieved. Printing a copy of the file was as fast as the printer could go.

Not Too Bad Really

High Technologies DBM system is a powerful tool and will do a lot of work for you. I discussed many of the items here with Nancy Galloway, Software Manager, at High Technology. She was quite helpful and suggested several things to simplify use of the system. Among them was the idea to set-up your master file on the text diskette and then use it for a master. Make copies and use the copies for saving your various data files. Nancy also mentioned that many improvements are being made in the system.

Even though I found the system awkward to use at first, I have not found any other that will do the job better. The system is available at computer stores. The cost is $99.50.□

```
 RUN

HOME INVENTORY FILE MANAGER
---------------------------
ENTER THE FILE NAME - HOME.INVEN

1980 01/14 20:46:09.640

FILE OPTIONS:

 1. BUILD NEW RECORDS
 2. ADD MORE RECORDS
 3. LIST RECORDS
 4. EDIT A RECORD
 5. KEYWORD SEARCH
 0. END THE PROGRAM

FILE 'HOME.INVEN' CONTAINS 5 RECORDS !

WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN

1   COUCH/DAY BED.........1134.95..02/77
2   LOVE SEAT.............0395.89..02/77
3   REFRIGERATOR..........0895.79..09/78
4   WASHER................0379.55..09/78
5   CASETTE DECK..........1145.37..12/79

PRESS RETURN TO CONTINUE -

WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN

1   COUCH/DAY BED.........1134.95..02/77
2   LOVE SEAT.............0395.89..02/77
3   REFRIGERATOR..........0895.79..09/78
4   WASHER................0379.55..09/78
5   CASETTE DECK..........1145.37..12/79

                          $3951.55

PRESS RETURN TO CONTINUE -
```

```
WHICH NUMBER - 5

KEYWORD SEARCH - HOME.INVEN

KEYWORD - 09/78

3 REFRIGERATOR..........0895.79..09/78

4 WASHER................0379.55..09/78

DO YOU WANT TO EDIT ? Y/N ?N

TRY ANOTHER KEYWORD ? Y/N ?N

PRESS RETURN TO CONTINUE -
```

```
MASTER FILE: (6,2) DISCOGRAPHY DATA FILE.MST

FIELD #    DESCRIPTION          TYPE
-------    -----------          ----
   1       TITLE                45,A
   2       ARTIST               35,A
   3       COMPOSER             50,A
   4       PRODUCER             30,A
   5       LABEL                20,A
   6       DATE                 6,N
   7       POSITION             3,N
   8       CONDITION            15,A
   9       REMARKS              20,A


SORT #     DESCRIPTION
------     -----------
   1       TITLE
   2       ARTIST
           *LABEL
           **DATE
   3       LABEL
           *DATE
   4       POSITION
```

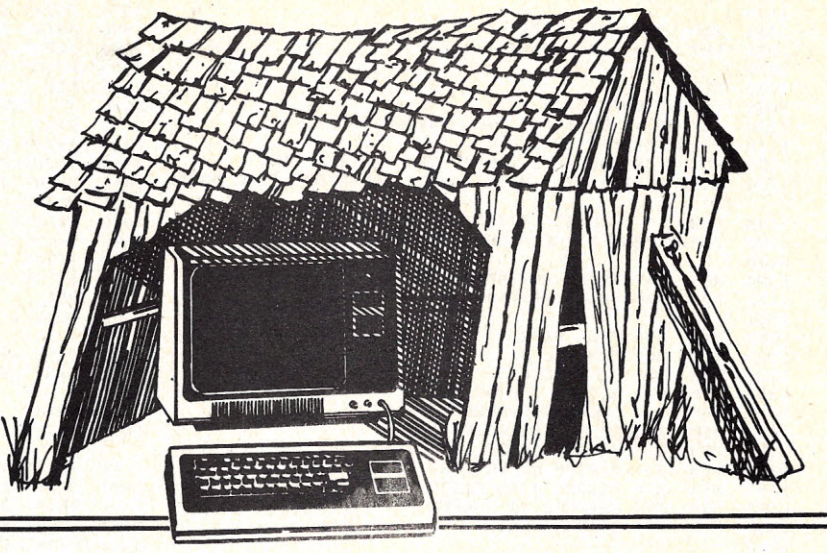
FIGURE 1

```
1000  REM ************************
1010  REM * SIMPLE FILE BUILDER *
1020  REM * BY: CHUCK CARPENTER *
1030  REM ************************
1040 :
1050  REM  ** INITIALIZE **
1060  REM  ****************
1070 :
1080  HOME
1090  ONERR  GOTO 2720
1100  LET D$ =  CHR$ (4): DIM R$(200):C = 1
1110  PRINT D$;"NOMON I,O,C"
1120  PRINT D$;"BLOAD B.TIME": REM  DATE & TIME
1130  HOME : VTAB (2): PRINT "HOME INVENTORY FILE MANAG
     ER"
1140  FOR I = 1 TO 27: PRINT "-";: NEXT I: PRINT
1150  INPUT "ENTER THE FILE NAME - ";F$
1160 :
1170  REM  ** SYSTEM VARIABLES **
1180  REM  **********************
1190 :
1200  REM  F$= FILE NAME
1210  REM  D$= CONTROL D
1220  REM  R$= FILE RECORD
1230  REM  A$= RETURN (CHR$(13))
1240  REM  Q$= LOCAL RESPONSE
1250  REM  I&J LOCAL VARIABLES
1260  REM  C = RECORD COUNT
1270  REM  S = OPTION SELECTION
1280  REM  R = RECORD # TO EDIT
1290  REM  K$= KEYWORD TO SEARCH
1300  REM  K = SEARCH FLAG
1310 :
1320  REM   ** OPERATING SYSTEM **
1330  REM   **********************
1340 :
1350  CALL 900: REM   DATE & TIME
1360  PRINT : PRINT "FILE OPTIONS:
1370  PRINT
1380  PRINT " 1. BUILD NEW RECORDS"
1390  PRINT " 2. ADD MORE RECORDS"
1400  PRINT " 3. LIST RECORDS"
1410  PRINT " 4. EDIT A RECORD"
1420  PRINT " 5. KEYWORD SEARCH"
1430  PRINT " 0. END THE PROGRAM"
1440  PRINT : PRINT D$"OPEN";F$;",L40"
1450  PRINT D$"READ";F$;",R";0: INPUT C
1460  PRINT D$"CLOSE";F$;""
1470  PRINT "FILE '";F$;"' CONTAINS ";C;" RECORDS !"
1480  PRINT : INPUT "WHICH NUMBER - ";S
1490  IF S > 5 GOTO 1350
1500  IF S = 0 THEN  PRINT : PRINT : PRINT "DONE": POKE
     216,0: PRINT D$"CLOSE";F$;"": SPEED= 255: END
1510  ON S GOTO 1520,1620,1900,2110,2350
1520 :
1530  REM  ** BUILD THE FILE **
1540  REM  ********************
1550 :
1560  HOME : VTAB (2): PRINT "BUILD FILE - ";F$;" "
1570  PRINT D$"OPEN";F$;",L40"
1580  PRINT D$
1590  GOTO 1770
1600 :
1610  REM  ** ADD RECORDS **
1620  REM  ******************
1630 :
1640  HOME
1650  PRINT : VTAB (2): PRINT "ADD FILE RECORDS - ";F
     $;"": PRINT
1660  PRINT D$"OPEN";F$;",L40"
1670  PRINT D$"READ";F$;",R";0
1680  INPUT C
1690  PRINT D$"READ";F$;",R";C
1700  INPUT R$(C)
1710  PRINT D$: PRINT
1720  PRINT "R";C;"";: PRINT  TAB( 6)R$(C)
1730  PRINT
1740  LET C = C + 1
1750 :
1760 :
1770  PRINT "R";C;" ";: INPUT R$(C)
1780  IF R$(C) = "END" GOTO 1840
1790  PRINT D$"WRITE";F$;",R";C
1800  PRINT R$(C)
1810  PRINT D$
1820  LET C = C + 1
1830  GOTO 1770
1840  LET C = C - 1: PRINT : PRINT C: PRINT
1850  PRINT D$"WRITE";F$;",R";0
1860  PRINT C
1870  PRINT D$"CLOSE";F$;""
1880  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
     A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
     1350
1890  HOME : GOTO 1880
1900 :
1910  REM  ** LIST RECORDS **
1920  REM  ********************
1930 :
1940  HOME
1950  PRINT : PRINT "LIST TEXT FILE - ";F$;""
1960  PRINT
1970  PRINT D$"OPEN";F$;",L40"
1980  PRINT D$"READ";F$;",R";0
1990  INPUT C
2000  PRINT D$
2010  FOR I = 1 TO C
2020  IF  PEEK ( - 16384) > 127 THEN  POKE  - 16368,0:
     WAIT - 16384,128,0: POKE  - 16368,0
2030  PRINT D$"READ";F$;",R";I
2040  INPUT R$(I)
2050  PRINT D$
2060  PRINT I; TAB( 4);R$(I)
2070  NEXT I
2080  PRINT D$"CLOSE";F$;""
2090  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
     A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
     1350
2100  HOME : GOTO 2090
2110 :
2120  REM  ** EDIT A RECORD **
2130  REM  ********************
2140 :
2150  HOME
2160  PRINT : PRINT "EDIT FILE RECORD - ";F$;"": PRINT

2170  PRINT "ENTER RECORD NUMBER - ";: INPUT R: PRINT
2180  PRINT D$"OPEN";F$;",L40"
2190  PRINT D$"READ";F$;",R";R
2200  INPUT R$(R)
2210  PRINT D$
2220  PRINT "RECORD ";R;" CHANGES - 35 CHARACTERS MAX."

2230  PRINT : PRINT "RECORD ";R;" ="
2240  PRINT " ";: PRINT R$(R)
2250  PRINT : INPUT "DO YOU WANT TO CHANGE IT - Y/N ";Q
     $: PRINT : IF Q$ = "N" GOTO 2320
2260  INPUT R$(R)
2270 :
2280  PRINT D$"WRITE";F$;",R";R
2290  PRINT R$(R)
2300  PRINT D$"CLOSE";F$;""
2310  VTAB 17
2320  PRINT "ANY MORE RECORDS Y/N ";: INPUT Q$: IF Q$ =
     "Y" GOTO 2110
2330  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
     A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
     1350
2340  HOME : GOTO 2330
2350 :
2360  REM  ** KEYWORD SEARCH **
2370  REM  ********************
2380 :
2390  HOME
2400  PRINT : PRINT "KEYWORD SEARCH - ";F$;""
2410  PRINT : INPUT "KEYWORD - ";K$
2420  LET K = 0
2430  PRINT D$"OPEN";F$;",L40"
2440  PRINT D$"READ";F$;",R";0
2450  INPUT C
2460  PRINT D$
2470  FOR J = 1 TO C
2480  PRINT D$"READ";F$;",R";J
2490  INPUT R$(J)
2500  PRINT D$
2510  FOR I = 1 TO 40 -  LEN (K$)
2520  IF  MID$ (R$(J),I, LEN (K$)) <  > K$ GOTO 2550
2530  PRINT : PRINT J;: PRINT " ";: PRINT R$(J)
2540  LET K = K + 1
2550  NEXT I
2560  NEXT J: PRINT
2570  IF K > 0 GOTO 2610
2580  PRINT : PRINT "NOTHING FOUND - ": PRINT "TRY ANOT
     HER KEY WORD ? Y/N ";
2590  INPUT Q$: IF Q$ = "Y" GOTO 2350
2600  IF Q$ = "N" GOTO 2660
2610  PRINT D$"CLOSE";F$;""
2620  PRINT : PRINT "DO YOU WANT TO EDIT ? Y/N ";
2630  INPUT Q$: IF Q$ = "Y" GOTO 2110
2640  PRINT : PRINT "TRY ANOTHER KEYWORD ? Y/N ";
2650  INPUT Q$: IF Q$ = "Y" GOTO 2350
2660  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
     A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
     1350
2670  HOME : GOTO 2660
2680 :
2690  REM  ** ERROR ROUTINE **
2700  REM  ********************
2710 :
2720  IF  PEEK (222) <  > 5 THEN  PRINT "PROCESSING ERR
     OR": SPEED= 255: GOTO 1350
2730  IF  PEEK (222) = 5 THEN  PRINT : PRINT "THIS IS A
     NEW FILE": FOR I = 1 TO 5000: NEXT : GOTO 1520
2740 :
2750  REM  CRC - 5 JAN 1979
2760 :
```

LISTING 1

TRS-80 Strings

Stephen B. Gray



In column 17, we look at kaleidoscope graphics with variations on RND(RND(X)), Radio Shack's mailing-list program, the disappearance of G/2, Hayden's Microtyping program, the fate of four TRS-80 cassette-tape magazines, and a directory that lists hundreds of TRS-80 tapes.

Variations On RND(RND(X))

In the Kaleidoscope Graphics section of the TRS-80 Strings column for Sep 1979 (p 186), it was shown how to skew the pattern blocks toward the four corners of the four-way-symmetrical design by using RND(RND(X)), and even more by using RND(RND (RND(X))).

The pattern, created by using the same number of RNDs for both the X and Y coordinates, is still four-way symmetrical. A whole new set of patterns, with their own particular attractiveness, can be created by using different numbers of RNDs for X and Y in the general program in the center of page 188, such as with:

```
110 X=RND(RND(A))
120 Y=RND(RND(RND(B)))
```

or the other way around by using

```
110 X=RND(RND(RND(RND(A))))
120 Y=RND(B)
```

Although the patterns are still four-way symmetrical, the more RNDs you use, the more two-way they seem. The first X-Y pair given above will provide a top-and-bottom pattern with a short gap across the middle; the second pair, a left-right pattern with a wider gap across the middle.

Just in case you don't have the September 1979 issue handy, here's the general kaleidoscope pattern, written more compactly:

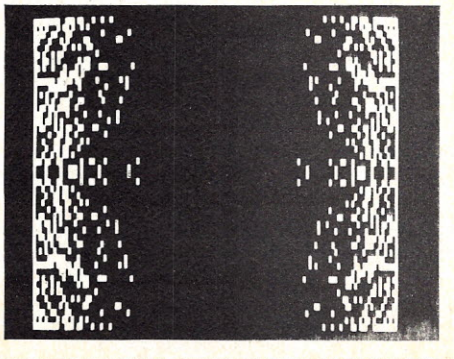
```
100 CLS:INPUT A,B:CLS
110 X=RND(A)
120 Y=RND(B)
130 C=2*A-X:D=2*B-Y
140 SET(X,Y):RESET(X+1,Y+1)
150 SET(X,D+1):RESET(X+1,D)
160 SET(C+1,Y):RESET(C,Y+1)
170 SET(C+1,D+1):RESET(C,D)
180 GOTO 110
```

Try from one to five RNDs for both X and Y. If the graphics blocks were square, you'd have the same type of pattern, turned 90 degrees, if you wrote, for example, one program with three RNDs in X and four in Y, and a second with four RNDs in X and three in Y. But because the graphics block is rectangular, each one of the 25 programs possible with one to five RNDs in both X and Y will produce basically different patterns.

Because these multi-RND patterns are sparser than single-RND ones, they lend themselves more to full-screen kaleidoscope patterns, which are too big and confusing when only one RND is used in both X and Y. Try, for instance,

```
110 X=RND(RND(RND(RND(A))))
120 Y=RND(B)
```

and A,B values of 63,23. You might call

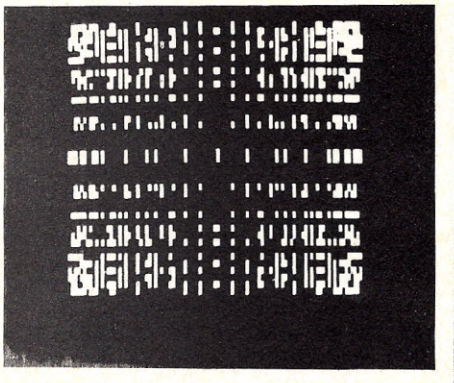


the resulting pattern something like "Twin Aliens Meet In Space," or "Space Garbage Meets Radar Reflector."

For something quite different, substitute these lines for 100-130 in the general program:

```
100 CLS:INPUT A,B,E,F:CLS
110 X=RND(A)*RND(B)
120 Y=RND(E)*RND(F)
130 C=2*A*B-X:D=2*E*F-Y
```

and use values for A,B,E,F such as 10,5,5,4. This looks best during the first few minutes, although at the end it has a certain charm, looking like a moth-eaten Mondrian.



Cassette Mailing List

This $19.95 Radio Shack program for a Level-II TRS-80 with at least 16K of ROM is also available at $39.95 on diskette for 32K two-disk business systems.

According to the manual, typical uses of the Mailing List System are club membership lists, customer lists for advertisement mailings, Christmas card lists, personal telephone directory, and client lists.

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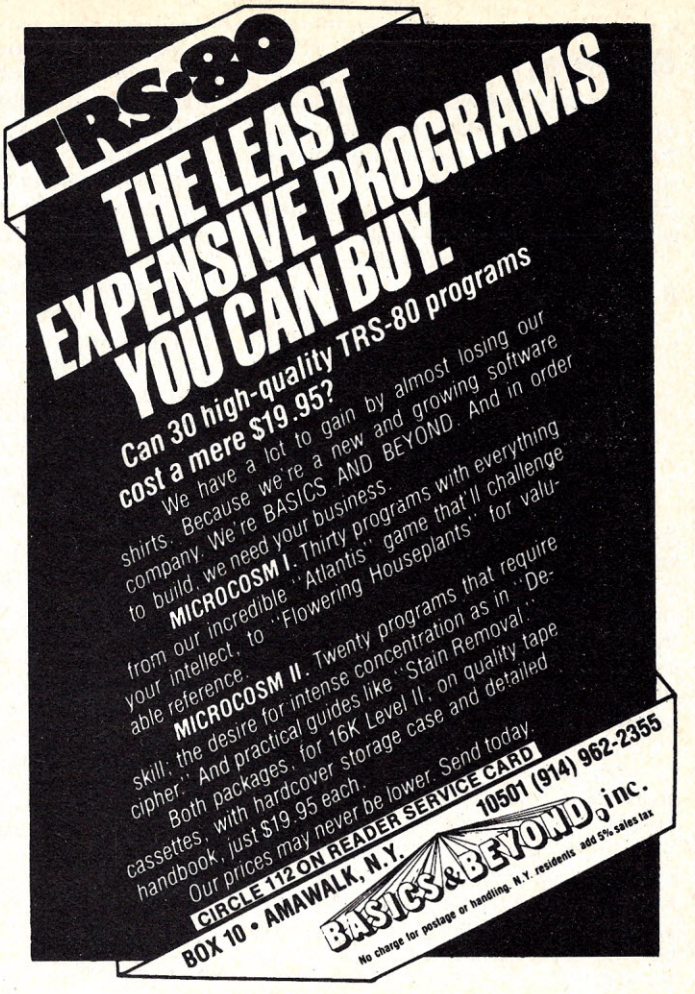

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SORT	32K	49	SORT	680K	2569
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Strings, cont'd . . .

For most of these uses, you'll want labels, which means you'll also need a tractor-feed line printer, expansion interface and labels, all of which Radio Shack can supply; the 3½-by-$^{15}/_{16}$-inch labels are Cat. No. 26-1404.

After you load in the tape, you get a menu:

(A)DD NAMES TO THE MAILING LIST
(R)EAD MAILING LIST FROM TAPE
(S)EARCH/CHANGE THE MAILING LIST
(L)IST NAMES ON THE SCREEN
(P)RINT MAILING LIST
(W)RITE MAILING LIST ON TAPE

You select one of the six options by typing the first letter of the command. If you select the first, you have the choice of including a telephone number or company name in the address, but not both. You enter name, company or telephone number, address, city, state, zip and, if you've opted to include it, a select code.

You may wish, as the manual says, to use the select code to indicate whether a person in your club-membership list has paid his dues. Using this code, "the club could then print labels for paid-up members to send them activities notices, and later print another set of labels for members-in-bad-standing to send them payment reminders."

Or you could print labels only for people who live in a certain state or city, or who have a zip code beginning with certain digits.

You can type the name with the family name first or last, but the program sorts according to the first name on the first line. So if you want the names to be sorted according to family name, you enter them in directory style,separating the last name from the first with a comma. When the labels are printed, the program will rearrange the name to print the first name first and the last name last.

Pressing L causes the names in memory to be listed on the screen, just the names only, in alphabetical order. Pressing S lets you locate a particular name for reference or alteration. You enter enough letters of the name to identify it, and you get a new menu, with six choices, along with the name and accompanying information. You can then display the name before or after the one on view, delete the name displayed, change part of the information, cancel the changes made, or search for a new name.

To print mailing labels, press P. The program asks if you want to print labels for the whole list, and if not, which field you would like to use for a select code, and then requests that you "type in a value for the select code." If you want to print labels only for members in Oshkosh, you type in OSHKOSH as the select code. Or, as the manual states, "This feature is especially useful when applied to the zip code field. By specifying the first 3 digits of the zip code, you can print labels for 'sorted bundles' and take advantage of reduced postal rates."

The program asks if you want a trial printing run, so you can align the labels and adjust the character size (if you're using a printer with that feature). If you reply Y instead of N, the first label will be printed three times. Once the labels are aligned, reply N for "no more trial runs" and press ENTER to start printing.

When printing is completed, the program asks if you want to read in any more tapes, which allows you to load additional names into memory and continue printing with the same selection criterion.

Cassette tapes are used to save names and addresses, so there is no limit to the number of cassette tapes you can create with the system. There is, however, a limit to the number of names on each tape, and it's a function of your TRS-80's memory size. If the average list entry is 50 characters long, you can put up to 150 names into 16K of RAM memory, up to 450 with 32K, and up to 750 with 48K.

The cassette program is packaged in a ring binder with one program cassette, one C-20 blank data cassette, and a 12-page manual. The last five pages contain a full listing of the program in Basic. The binder has space for six more cassettes, handy storage if you have a long mailing list.

The disk version seems to be exactly the same. It comes with one program diskette and one blank diskette in a bound manual. Each blank diskette will hold about 600 names, with the exact number depending on the length of the listings.

According to the software info sheet on the Disk Mailing List System, "If you don't need a mailing list, you could use it [the program] to catalog items of various types and print selected lists for you . . . with or without program modification."

This is just the program for your club or business if you have more than a small number of labels to print regularly.

G/2 Is GWTW

If you've been wondering what happened to those fancy four-color ads for the G/2 Program Library that GRT Corp. was running in **Creative** and elsewhere in 1978, it's because G/2, GRT's Consumer Computer Group, no longer exists. GRT, of Sunnyvale, CA, filed Chapter XI of the federal bankruptcy laws, after losing over two million dollars up to the fall of 1978.

G/2 had several dozen cassette tapes for the Apple, Southwest, Sol, PET, Sorcerer and Level-II TRS-80. The half-dozen for the TRS-80 included Beat The House (blackjack, craps, roulette, slot machine), Clinic (biorhythms, dieting, longevity), Personal Finance (Checkbook, Best Choice). That last program was for decision-making.

All the principles of the G/2 division left GRT in late 1978, and the software companies that had licensed GRT to manufacture and market their products, have taken back the programs. These programs will now, in some cases, be marketed by the companies that wrote them, such as Level III by Microsoft.

GRT continues with their main business, which is producing and marketing pre-recorded music tapes. Music tapes can stand a lot of dropouts and other problems before they really get bad. But I couldn't even load the copy of Clinic that G/2 sent.

Incidentally, I heard that to make writing the G/2 tapes as easy as possible, no graphics were used at all.

So G/2 is gone with the wind, cancelling an ambitious assortment of tapes that also included Oil Tycoon, Adventure, The Market and a couple of Extended Basics.

Microtyping

Microtyping is the first of the "Hayden Computer Program Tapes" I've checked out, and it is one of the most ingenious and useful programs I've even come across, well worth the $10.95 price.

Written for Level-II 16K machines by Dr. C. William Engel, who wrote the *Simulating Simulations* games programs (available now in book form from Hayden Book Co. for $4.95), the cassette comes in a plastic envelope (with a hole near the top, for peg-board or stand mounting) that's handy to keep the cassette in.

Also in the envelope is an attractive four-page folder. The cover shows a logo and title in black and white on green, distinctive enough to be spotted across the room in your local computer store, which is where you can buy this tape (or if not available, from the Sales Dept., Hayden Book Co., Inc., 50 Essex St., Rochelle Park, NJ 07662.)

The folder's back cover, which you can read through the plastic envelope in the computer store, tells you that *Microtyping* teaches touch typing, and gives some details.

Strings, cont'd . . .

The inside two pages comprise a User's Guide, which tells how to load and use the program. The program is divided into four levels: 1-letters, 2-numbers and symbols, 3-words, 4-text and program listings. "In each level the user receives immediate feedback regarding speed and errors. In Level 1 and 2, response speed is graphically represented by the distance between the symbol presentation and the student's response. If the response is too low or in error, the word SLOW or ERROR appears on the screen. In Levels 3 and 4, the student's response is not printed unless the correct key is pressed."

The correct finger placement on the "home keys" is shown, and "it is recommended that the student begin with the first level of difficulty in Level 1 and remain at that level until 50 wpm can be typed with no errors before proceeding to the next level of difficulty."

The guide ends with instructions on How to Insert New Practice Material in The Program, a very practical idea. The program is in Basic, so you can easily change any of the DATA lines to put in new symbols, words and sentences.

In each of the four levels, the instructions and all other material shown on the screen is in double-width characters for easy reading; the menus are in standard-width characters.

In Level 1 — Letters, you select the level of difficulty, 1 to 9, and you're presented with one letter at a time, from a group of three letters if you're at level of difficulty 1, from a group of six letters at level of difficulty 2, on up to the whole alphabet at 9.

You're shown 20 individual letters in each session, at each level of difficulty in Level 1, and as you type in the letter you're shown, it's repeated on the screen, to the right of the letter displayed by the computer, at a distance proportional to the speed with which you enter the letter after seeing the original display.

If you're really slow, then SLOW is displayed on the screen instead of the letter. ERROR is displayed if you don't match the letter displayed.

At the end of the session, you find out how you've done, in words per minute and number of errors. You can then continue at the same level of difficulty, or move on to a more (or less) difficult level, or move on to Level 2 — Numbers and Symbols.

In Level 2, you also get a session in which you match 20 characters, one at a time, at one of eight levels of difficulty, starting with one character chosen from a group of four characters, and ending, at the top level of difficulty, with a character chosen from the 32 numbers and symbols on the TRS-80 keyboard. This begins to get difficult, and if you're tempted to look at the keys, remember: you'll never learn touch-typing if you look.

Level 3 — Words presents 20 three-letter words per session, at nine levels of difficulty, from 45 words stored in the program. You can easily change any of these 45 to words of the same length, or longer.

In Level 4 — Text and Program Listings, the menu has nine selections. You can practice six selected groups of letters, or all letters, or numbers and letters, or program listings. If you select "numbers and letters," you type a sentence or two that combines words and numbers; the program selects from a group of seven in DATA lines. There's only one "program listing" stored in a DATA line, and although it's fairly complex, you can easily change it, or any of the seven groups of sentences, if you want more variety or harder material.

At all four levels, you get your words-per-minute and number-of-errors ratings.

Microtyping is a real winner in the category of useful programs. The touch-typing skill learned with this program is transferrable to a typewriter, although the symbols will, of course, be a little different.

Cassette-Tape "Magazines"

By the time you read this, Radio Shack may well have sold 300,000 TRS-80 Model I computers. Looking at that number, you might think there's plenty of room in the marketplace for more than just one of any type of TRS-80 product.

But just because there are many thousands of TRS-80 owners, doesn't always mean, as several entrepreneurs have found out, that money can be made by generating a product similar to something already on the market.

Take tape "magazines," for instance. CLOAD was there first, with a monthly tape that steadily improved, and which, even with a $36 yearly subscription price, is doing quite well. They've issued a "Best of CLOAD," at $10 (Box 1267, Goleta, CA 93017).

Several other TRS-80 tape magazines have been advertised. Two died before publishing their first monthly tape: LEVEL I (monthly, $40 a year, Anaheim, CA); and Tape Talk (bi-monthly, $?, San Jose, CA).

A fourth, Gaudeus (monthly, $30, Ozone Park, NY), was to have been a cassette magazine in several editions, for PET, TRS-80, Apple II and Sorcerer, but nothing has been heard from them for awhile.

TRS-80 Software Source

The Summer 1979 edition of "TRS-80 Software Source," which is an 8½-by-11-inch paperback, has over 4,000 listings from 250 vendors. The six main class divisions are business, education, games, home, math and utility.

The listings are given in 16 different ways. Games are on only one list, alphabetically by title. The other five classes are each listed three ways: alphabetically by title and by vendor, and by Basic (Level-I or Level-II, 4K or 16K). The 17th list is of vendor names, addresses and phone numbers.

For each listing, you get a title, description (up to 27 characters), level, price, media, class and vendor.

At this writing, the price of a single issue is $6, from Computermat, Box 1664, Lake Havasu, AZ 86403. As the size of the publication increases, due to more and more available programs, don't be surprised if the price also increases.

The directory is published in the spring, summer and fall. The Fall 1979 issue is expected to contain over 5,000 listings. When the directory was first published, a subscription price of $12 a year was set. However, according to a note from Computermat, "We have decided to discontinue the subscriptions. Most of our orders are for a single issue."

The directory is well worth the $6 for anybody interested in buying more than just an occasional TRS-80 program. But there's one problem with the listings that may be unsolvable. Some programs are listed more than once. When there are three listings for "Library 100," most of us know that's The Bottom Shelf set of programs available from TBS and two others.

But what about the seven listings of Biorhythm, nine of Renumber, and 21 of Inventory? How many are duplicates? How can you decide which to order from the vendor? The cheapest one? Biorhythm ranges from $3 to $9.95, and Renumber from $9.95 to $20 on cassette. So what do you do, pick a price in the middle and hope for the best?

The Summer 1979 directory includes a "software review" questionnaire asking for detailed information from readers on programs. Computermat intends to "compile the results and print them in the next issue." That may help, at least for those programs for which reviews are received, but which may be for only a small percentage of the thousands of programs available.

Well, it's a start, and we can only wish Computermat well, with what is a very large undertaking: collating the information in all those reviews. That is, if altruistic readers send them in. □

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Package PK 500: BSR X-10 Command Console, cordless controller, two lamp modules and one appliance module. $124.99.

Separate Prices: UC 301 Command Console, $49.95; CC 401 Cordless Remote Controller, $24.99; LM 501 Lamp Module, $16.99; AM 601 Appliance Module, $16.99; WS 701 Wall Switch Module, $16.99.

Note: Your BUSY BOX will not work with the Radio Shack Home Controller, a stripped down version of the BSR X-10.

HARDSIDE

Shipping costs are not included in prices.

To order, call TOLL FREE 1-800-258-1790. (in NH call 673-5144)

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TRS-80* COMPUTERS:

	OUR PRICE
Level I, 4K $499.00	$449.00
Level II, 4K $619.00	$559.00
Level II, 16K, no keypad	$669.00
Level II, 16K, w/keypad $849.00	$769.00

EXPANSION INTERFACES:

Exp. Int., no RAM $299.00	$269.00
Exp. Int., 16K RAM, (NEC) $448.00	$369.00
Exp. Int., 32K RAM, (NEC) $597.00	$459.00

DISK DRIVES:

Percom, TFD-100, 40-tracks $399.00	$389.00
Percom, Dual TFD-100's $795.00	$775.00
Percom, TFD-200, 77-tracks $675.00	$625.00
Percom, Dual TFD-200's $1350.00	$1250.00

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2-drive cable for TRS-80* $29.95	$29.00
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Centronics 753-2 $3196.00	$2750.00
Centronics 779-2 $1559.00	$1064.00
RS Quick Printer II $219.00	$197.00
RS Line Printer III $1960.00	$1813.00
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LRC 7000+(64 column) $405.00	$389.00

PRINTER CABLES:

QPII to Exp. Int. cable	$19.00
LRC to TRS-80* cable	$20.00
730 to TRS-80* cable	$29.00
779 or 753 to TRS-80* cable	$35.00

PERIPHERALS:

Novation CAT Modem $199.95	$179.00
RS-232-C Interface Board $99.00	$89.00
TRS-232 Printer Interface	$49.95
Data Dubber	$49.95
16K Memory Upgrade Kit, Keyboard	$99.00
16K Memory Upgrade Kit, E.I.	$95.00
Percom Electric Crayon	$249.95
Busy Box	$104.95

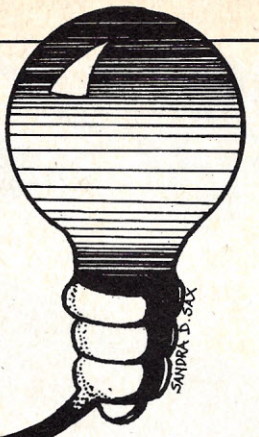
We Buy and Sell Used TRS-80*

Ask for our FREE catalog!

CIRCLE 221 ON READER SERVICE CARD

*TRS-80 is a trademark of Radio Shack and Tandy Corp.

Compleat Computer Catalogue



COMPUTERS

8-BIT MICROCOMPUTER FOR SMALL BUSINESS

The Centurion 8-bit microcomputer is built around Intel's 8085A-2 microprocessor, which has a processing speed of 5 MHz, but system speed is 7MHz because a floating point math chip is used to handle number-crunching calculations.

Designed to be a complete, integrated system, the Centurion features 16K of internal PROM, 64K of RAM, a floppy disk controller, CP/M operating system, built on Artec's shielded motherboard. It operates with a CRT terminal and up to four single-sided, double-density, 8-inch floppy disk drives, and is compatible with any printer having an RS-232 interface.

The single-quantity price of the Centurion I with a Hazeltine 1500 CRT terminal is $10,825.

Artec Electronics, 605 Old County Rd., San Carlos, CA 90470. (415) 592-2740.

CIRCLE 250 ON READER SERVICE CARD

CLUSTERSHARED MICROCOMPUTER SYSTEM

Nestar Systems announces a new Clustershared personal computer system with the introduction of the Cluster/One, Model A for the Apple. Now, up to 64 Apple II computers may be tied together in a local network.

Users may communicate with one another, share data, and access the same files, while the individual computer remains free to tackle accounting or scientific problem solving without being tied down by other computers in the system.

Professional and business offices as well as departments within large firms can take advantage of a Clustershared system, typically consisting of multiple Apple II computers, the Nestar Cluster/One, Model A, and shared resources such as printers, data recorders, plotters or graphics tablets.

The Nestar Cluster/One, Model A will be priced at $6,000 for the basic system with 1,260,000 bytes of storage. The optional 16.5 and 33 Mb hard disk systems will cost $8,000 and $10,000 respectively. A ClusterBus communication card, priced at $400, is required for each user station on the network. The cost of the Apple II personal computers are separate and must be added into the total network price.

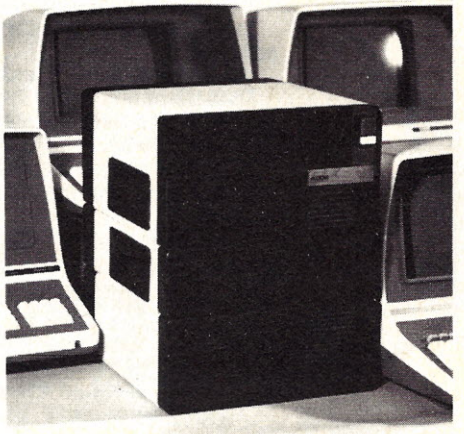
Nestar Systems, Incorporated, 430 Sherman Ave., Palo Alto, CA 94306. (415) 327-0125.

CIRCLE 251 ON READER SERVICE CARD

MULTIVISION FAMILY FROM ADDS

Applied Digital Data Systems Inc., (ADDS), Hauppauge, N.Y. is the world's largest supplier of display terminals to original equipment manufacturers. More than 25% of all displays shipped to OEMs are made by ADDS. The company also produces programmable terminals, clustered terminals and small business computer systems.

ADDS has now introduced a family of modular small business computers including hard disk storage and multi-user capability. The ADDS Multivision 1 entry level



computer lists for $3785 and includes a 5 MHz processor, 64K byte RAM, and 700K bytes of dual mini-floppy based storage.

ADDS has developed a CP/M*-compatible, multi-user operating system that supports the Microsoft BASIC Interpreter and Compiler, a proprietary word processing package, five business application packages and a powerful ISAM capability.

For users requiring more data storage, an 8-inch Winchester disk drive is available. Option 1 provides 5M bytes of storage while Option 2 provides 10M bytes. The unit measures a compact 15″ square by 6″ high.

Multivision 3 permits the simultaneous operation of as many as four display terminals. Multivision 2 systems can be field upgraded to Multivision 3 with the addition of an expansion box that supports a 4 port adapter end up to three additional 64K byte RAM boards, yielding a system total of 256K bytes of memory.

A new file type has been added to standard CP/M* file system to provide efficient access to the Winchester disk. The software includes both a BASIC Interpreter and a BASIC Compiler. The Interpreter permits easy development of software; where-

NEW PRODUCTS!

Super Color S-100 Video Kit $99.95

Expandable to 256 x 192 high resolution color graphics. 6847 with all display modes computer controlled. Memory mapped. 1K RAM expandable to 6K. S-100 bus 1802, 8080, 8085, Z80 etc.

Gremlin Color Video Kit $59.95

32 x 16 alpha/numerics and graphics; up to 8 colors with 6847 chip; 1K RAM at E000. Plugs into Super Elf 44 pin bus. Not expandable to high resolution Graphics.

Elf II Adapter Kit $24.50

Plugs into Elf II providing Super Elf 44 and 50 pin bus plus S-100 bus expansion (With Super Expansion). High and low address displays, state and mode LED's optional **$18.00.**

1802 16K Dynamic RAM Kit $149.00

1802/S-100 expandable to 32K, Hidden refresh w/clocks up to 4 MHz w/no wait states Addl. 16K RAM **$79.00.**

Quest Super Basic

Quest, the leader in inexpensive 1802 systems announces another first. Quest is the first company worldwide to ship a **full size Basic** for 1802 systems. A complete function **Super Basic** by **Ron Cenker** including floating point capability with scientific notation (number range ±.17E⁻⁹⁹), 32 bit integer ±2 billion; Multi dim arrays; String arrays; String manipulation; Cassette I/O, Save and load, Basic, Data and machine language programs; and over 75 Statements, Functions and Operators.

Easily adaptable on most 1802 systems. Requires 12K RAM minimum for Basic and user programs. Cassette version in stock now. ROM versions coming soon with exchange privilege allowing some credit for cassette version.

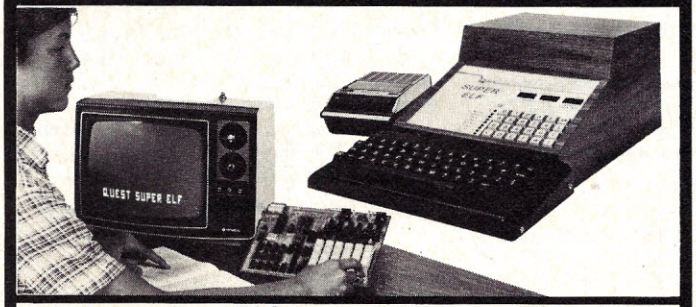
Super Basic on Cassette $40.00

Tom Pittman's 1802 Tiny Basic Source listing now available. Find out how Tom Pittman wrote Tiny Basic and how to get the most out of it. Never offered before. $19.00

S-100 4-Slot Expansion $ 9.95

Super Monitor VI.I Source Listing $15.00

Coming Soon: Assembler, Editor, Disassembler, DA/AD, Super Sound/Music, EPROM programmer, Stringy Floppy Disc System.



RCA Cosmac Super Elf Computer $106.95

Compare features before you decide to buy any other computer. There is no other computer on the market today that has all the desirable benefits of the **Super Elf** for so little money. The Super Elf is a small single board computer that does many **big** things. It is an excellent computer for training and for learning programming with its machine language and yet it is easily **expanded** with **additional memory, Full Basic, ASCII Keyboards, video character generation, etc.**

Before you buy another small computer, see if it includes the following features: ROM monitor; State and Mode displays; Single step; Optional address displays; Power Supply; Audio Amplifier and Speaker; Fully socketed for all IC's; Real cost of in warranty repairs; Full documentation.

The **Super Elf** includes a **ROM** monitor for program loading, editing and execution with **SINGLE STEP for program debugging** which is not included in others at the same price. With **SINGLE STEP** you can see the microprocessor chip operating with the **unique Quest** address and data bus displays **before, during** and **after** executing instructions. Also, CPU mode and instruction cycle are decoded and displayed on 8 LED indicators.

An RCA 1861 **video graphics** chip allows you to connect to your own TV with an inexpensive video modulator to do graphics and games. There is a **speaker system** included for writing your own music or using many music programs already written. The speaker amplifier may also be used to drive relays for control purposes.

A 24 key **HEX keyboard** includes 16 HEX keys plus **load, reset, run, wait, input, memory protect, monitor select** and **single step**. Large, on board displays provide output and optional **high and low address**. There is a 44 pin standard connector slot for PC cards and a 50 pin connector slot for the Quest Super Expansion Board. Power supply and sockets for **all** IC's are included in the price plus a detailed 127 pg. instruction manual which now includes over 40 pgs. of software info. including a series of lessons to help get you started and a music program and graphics target game. Many schools and universities are using the Super Elf as a course of study. OEM's use it for training and R&D.

Remember, other computers only offer Super Elf features at additional cost or not at all. **Compare before you buy. Super Elf Kit $106.95, High address option $8.95, Low address option $9.95. Custom Cabinet** with drilled and labelled plexiglass front panel **$24.95.** Expansion Cabinet with room for 4 S-100 boards **$41.00. NiCad Battery Memory Saver Kit $6.95.** All kits and options also completely assembled and tested.

Questdata, a 12 page monthly software publication for 1802 computer users is available by subscription for $12.00 per year. Issues 1-12 bound $16.50.

Tiny Basic Cassette **$10.00**, on ROM **$38.00,** original Elf kit board **$14.95. 1802 software;** Moews Video Graphics **$3.50.** Games and Music **$3.00,** Chip 8 Interpreter **$5.50.**

Super Expansion Board with Cassette Interface $89.95

This is truly an astounding value! This board has been designed to allow **you** to decide how you want it optioned. **The Super Expansion Board comes with 4K of low power RAM** fully addressable anywhere in 64K with built-in memory protect and a **cassette interface**. Provisions have been made for all other options on the same board and it fits neatly into the hardwood cabinet alongside the **Super Elf**. The board includes slots for up to 6K of **EPROM** (2708, 2758, 2716 or TI 2716) and is **fully socketed.** EPROM can be used for the monitor and Tiny Basic or other purposes.

A IK Super ROM Monitor $19.95 is available as an on board option in 2708 EPROM which has been preprogrammed with a program loader/editor and error checking multi file cassette read/write software, (relocatible cassette file) another exclusive from Quest. It includes register save and readout, block move capability and video graphics driver with blinking cursor. Break points can be used with the register save feature to isolate program bugs quickly, then follow with single step. The Super Monitor is written with subroutines allowing users to take advantage of monitor functions simply by calling them up. Improvements and revisions are easily done with the monitor. If you have the **Super Expansion Board** and **Super Monitor** the monitor is up and running at the push of a button.

Other on board options include **Parallel Input and Output Ports** with **full handshake**. They allow easy connection of an ASCII keyboard to the input port. **RS 232 and 20 ma Current Loop** for teletype or other device are on board and if you need more memory there are two **S-100** slots for static RAM or video boards. Also a 1K Super Monitor version 2 with video driver for full capability display with Tiny Basic and a video interface board. **Parallel I/O Ports $9.85, RS 232 $4.50, TTY 20 ma I/F $1.95, S-100 $4.50.** A **50 pin connector set** with ribbon cable is available at $15.25 for easy connection between the **Super Elf** and the **Super Expansion Board.**

Power Supply Kit for the complete system (see Multi-volt Power Supply below).

P.O. Box 4430A, Santa Clara, CA 95054
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7409N	.23	LM320T-8	1.60	CD4025	.28	2111-1	3.75	N82S126	3.75
7410N	.18	LM320T-12	1.50	CD4026	2.00	2112-2	3.95	N82S129	3.75
7414N	.70	LM320T-15	1.60	CD4027	.66	2114L 300ns	7.40	N82S131	3.75
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7422N	.39	LM339N	1.55	CD4029	1.02	8/4116 200ns	64.00	N82S137	8.75
7430N	.20	LM340K-5	1.35	CD4030	.42	2513E	6.30	DM8577	2.90
7442N	.50	LM340K-8	1.35	CD4035	1.02	MM5262	.40	8223	2.90
7445N	.69	LM340K-12	1.35	CD4040	1.02	MM5280	3.00	8/2716 Intel	240.00
7447N	.60	LM340K-15	1.35	CD4042	.85	MM5320	9.95		
7448N	.69	LM340K-24	1.35	CD4043	.85	MM5330	5.94	**CONNECTORS**	
7450N	.18	LM340T-5	1.25	CD4044	.85	PD4111D-3	4.00	30 pin edge	2.50
7474N	.35	LM340T-8	1.25	CD4046	1.67	PD411D-4	5.00	44 pin edge	2.75
7475N	.49	LM340T-12	1.25	CD4049	.45	P5101L	8.95	100 pin edge	4.50
7485N	.88	LM340T-15	1.25	CD4050	.49	4200A	9.95	100 pin edge WW	5.25
7489N	1.85	LM340T-18	1.25	CD4051	1.13	8/2525	2.90		
7490N	.43	LM340T-24	1.25	CD4060	1.42	91L02A	1.50	**IC SOCKETS**	
7492N	.43	LM343H	4.50	CD4066	.71	HD0165-5	6.95	**Solder Tin Low Profile**	
7493N	.43	LM350	7.50	CD4068	.40	MM57100	4.50	**PIN 1UP PIN 1UP**	
7495N	.69	LM370	1.15	CD4069	.40	GIAY38500-1	9.95	8 .15 22 .30	
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74107N	.35	LM379	5.00	CD4071	.28	9368	3.50	16 .16 28 .42	
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74125N	.45	LM382	1.60	CD4075	.28			2 level 14 pin ww .20	
74145N	.69	LM703H	.40	CD4076	1.45	**CLOCKS**			
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74192N	.87	LM1307	2.00	CD4516	1.10	MM5375AG/N	4.90	5 MHz	4.25
74193N	.85	LM1310	2.75	CD4518	1.02	7205	16.50	10 MHz	4.25
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74365N	.66	LM1812	7.50	CD4528	.79	7209	4.95	32 MHz	3.90
74366N	.66	LM1889	3.00	CD4553	3.50	DS0026CN	3.75	32768 Hz	4.00
74367N	.66	LM2111	1.75	CD4566	2.25	DS0056CN	3.75	1.8432 MHz	4.50
		LM2902	1.50	CD4583	4.50	MM53104	2.50	3.5795 MHz	1.20
74LS00 TTL		LM3900N	.60	CD4585	1.10			2.0100 MHz	1.95
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74LS38N	.55	78M05	.85	74C160	1.44	Z80A	19.75	AY5-3600	17.95
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74LS95N	1.10			74C906	.75	8228	5.35	HD0165-5	6.95
74LS107N	.45	**A to D CONVERTER**		74C914	1.95	8251	8.50		
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74LS182N	1.15	ICL7107	14.25	8095	.65	CDP1802CD	19.95	DA15S	3.10
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74LS190N	1.06	CD34001 Fair.	.50	8098	.65			**multimeter 69.95**	
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74LS258N	.67	CD4001	.28	8T10	4.50	AY5-1013	5.50	**Auto Clock Kit 17.95**	
74LS367N	1.35	CD4002	.28	8T13	3.00	AY5-1014	7.50		
		CD4006	1.10	8T20	5.50	3341	6.95	**Not a Cheap Clock Kit $14.95**	
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CA3081	1.80	CD4010	.45	8T26	1.69	2708	7.75		
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CA3086	2.95	CD4012	.28	8T97	1.69	2716 Intel	34.95		
LM301AN/AH	.35	CD4013	.39	8T98	1.69	8/2716 Intel	240.00		
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LM307N	.35	CD4015	1.00	**MOS/MEMORY**		2758	22.50		
LM308N	.89	CD4016	.45	**RAM**		8741A	85.00		
LM309K	1.50	CD4017	1.05	2101-1	3.95	8748	75.00		
LM311H/N	.90	CD4018	.94	2102-1	.95	8748-8	70.00	**8K/16K Eprom Kit**	
LM317/K	3.75	CD4019	.45	2102AL-4	1.25	8755A	65.00	(less PROMS) $89.00	
LM318	1.35	CD4020	1.02	2102AN-2L	1.60	N82S23	2.95	**Motherboard** $39.00	
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Model 10 Trigger Expander Kit $229.00
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Sinclair 3½ Digit Multimeter $59.95
Clock Calendar Kit $23.95
2.5 MHz Frequency Counter Kit $37.50
30 MHz Frequency Counter Kit $47.75

TRANSFORMERS
6V 300 ma 3.25
12 Volt 300 ma transformer 1.25
12.6V CT 600 ma 3.75
12V 250 ma wall plug 2.95
12V CT 250 ma wall plug 3.50
24V CT 400 ma 3.95
10V 1.2 amp wall plug 4.85
12V 6 amp 12.95
12V 500 ma wall plug 4.75
12V 1 amp wall plug 6.50
12V 3 amp 8.50
10/15 VAC 8/16 VA wall plug 9.75

DISPLAY LEDS

MAN1	CA	.270	2.90
MAN3	CC	.125	.39
MAN72/74	CA/CA	.300	1.00
DL704	CC	.300	1.25
DL707/DL707R	CA	.300	1.00
DL727/728	CA/CC	.500	1.90
DL747/750	CA/CC	.600	1.95
DL750	CC	.600	1.95
FND359	CC	.357	.70
FND500/507	CC/CA	.500	1.35
FND503/510	CC/CA	.500	.90
FND800/807	CC/CA	.800	2.20
3 digit Bubble			.60
4 digit Bubble			.80
DG8 Fluorescent			1.75
DG10 Fluorescent			1.75
5 digit 14 pin display			1.00
10 digit display			1.25
7520 Clairex photocells			.39
TIL311 Hex			9.50
MAN3640	CC	.30	1.10
MAN4610	CA	.40	1.20
MAN4640	CC	.40	1.20
MAN4710	CA	.40	.95
MAN4740	CC	.40	1.20
MAN6640	CC	.56	2.95
MAN6710	CA	.60	1.35
MAN6740	CC	.60	1.35

MA1002A	**8.95**
MA1002E	**8.95**
MA1012A	**8.95**
102P3 transformer	**2.25**

ROCKWELL AIM 65 Computer

6502 based single board with full ASCII keyboard and 20 column thermal printer. 20 char. alphanumeric display, ROM monitor, fully expandable. $375.00. 4K version $450.00. 4K Assembler $85.00, 8K Basic Interpreter $100.00.

Special small power supply for AIM65 assem. in frame **$49.00.** Complete AIM65 in thin briefcase with power supply **$485.00.** Molded plastic enclosure to fit AIM65 plus power supply **$47.50.** Special Package Price: 4K AIM, 8K Basic, power supply, cabinet **$599.00**

AIM65/KIM/VIM/Super Elf 44 pin expansion board; 3 female and 1 male bus. Board plus 3 connectors **$22.95.**

AIM65/KIM/VIM I/O Expansion Kit; 4 parallel and 2 serial ports plus 2 internal timers **$39.00.** PROM programmer for 2716 **$150.00.**

Multi-volt Computer Power Supply

8v 5 amp, ±18v .5 amp, 5v 1.5 amp, −5v .5 amp, 12v .5 amp, −12 option. ±5v, ±12v are regulated. Kit $29.95. Kit with punched frame $37.45, $4.00 shipping. Kit of hardware $14.00. Woodgrain case $10.00, $1.50 shipping.

PROM Eraser Will erase 25 PROMs in 15 minutes. Ultraviolet, assembled **$37.50** Safety switch/Timer version **$69.50**

60 Hz Crystal Time Base Kit $4.40

Converts digital clocks from AC line frequency to crystal time base. Outstanding accuracy.

NiCad Battery Fixer/Charger Kit

Opens shorted cells that won't hold a charge and then charges them up, all in one kit w/full parts and instructions. **$7.25**

LRC 7000+Printer $389.00

40/64 column dot matrix impact, std. paper. Interface all personal computers.

Televideo Terminal $845.00

102 key, upper, lowercase, 10 Baud rates 24 x 80 char. microprocessor cont. edit. cap.

Intertube II Terminal $874.00

Super Brain Floppy Disk Terminal $2895.00

79 IC Update Master Manual $29.95

Complete IC data selector, 2500 pg. master reference guide. Over 50,000 cross references. Free update service through 1979. Domestic postage $3.50. No foreign orders.

S-100 Computer Boards

8K Static RAM Kit	$135.00
16K Static RAM Kit	265.00
24K Static RAM Kit	423.00
32K Static RAM Kit	475.00
16K Dynamic RAM Kit	199.00
32K Dynamic RAM Kit	310.00
64K Dynamic RAM Kit	470.00
Video Interface Kit	**$129.00**

Video Modulator Kit $8.95

Convert TV set into a high quality monitor w/o affecting usage. Comp. kit w/full instruc.

Digital Temp. Meter Kit $34.00

Indoor and outdoor. Switches back and forth. Beautiful. 50" LED readouts. Nothing like it available. Needs no additional parts for complete, full operation. Will measure −100° to +200°F, tenths of a degree, air or liquid. Beautiful woodgrain case w/bezel **$11.75**

TERMS: $5.00 min. order U.S. Funds. Calif residents add 6% tax.
BankAmericard and Master Charge accepted.
Shipping charges will be added on charge cards.

FREE: Send for your copy of our NEW 1980 QUEST CATALOG. Include 28¢ stamp.

as for running programs the Compiler is three to four times faster than the Interpreter. Single key and multi key ISAM provide quick access to data stored on the Winchester disk.

Five accounting software packages are available: payroll, general ledger, accounts receivable and payable, and inventory. Multivision 3 measures 15 inches square by 18 inches.

The list price schedule of Multivision is as follows:
Multivision 1 — $3785.00
Multivision 2 (5M byte option) — $7995.00
Multivision 3 (256K bytes, 4 display ports, 1 printer port) — $12,885.00.

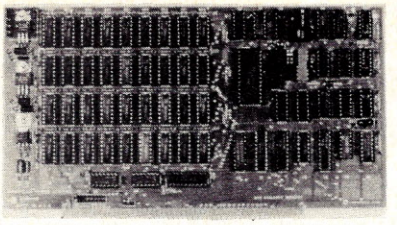
Applied Digital Data Systems, Inc., 100 Marcus Blvd., Hauppauge, NY 11787. (516) 231-5400.

CIRCLE 252 ON READER SERVICE CARD

64K MEMORY BOARD

The Model 460 64K Byte Dynamic RAM Memory Board, a high-speed low-power memory system, available from Industrial Micro Systems, provides 64K bytes of memory organized into four blocks, each of which is individually deselectable under program control for memory mapping.

The parity feature of Model 460 provides increased data security. In



the event of an error, a parity bit is set which lights an LED on the board and may be used to set a vectored interrupt or halt the CPU. The Model 460 also supports 8080 or Z80 CPU's and operates at 4 MHz with no wait states.

Industrial Micro Systems, Inc., 628 Eckhoff St., Orange, CA 92668. (714) 978-6966.

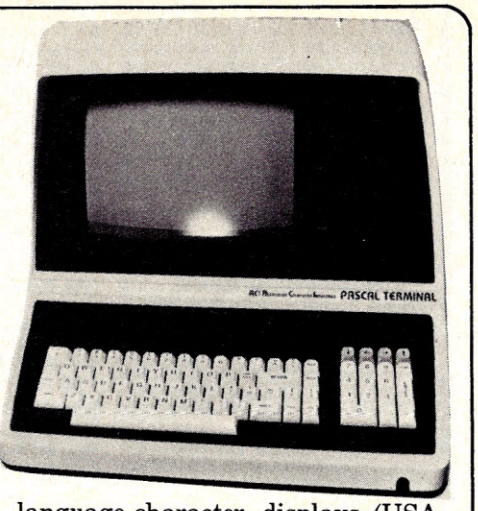
CIRCLE 253 ON READER SERVICE CARD

Terminals & I/O

PASCAL TERMINAL

The ACI Pascal Video terminal is a twelve-inch CRT (24 lines by 80 characters) for use with the UCSD Pascal Operating System or other applications requiring simular video terminal capabilities.

It provides standard upper/lower case 96 ASCII character set and it accommodates several international



language character displays (USA, UK, French, German, Spanish, Danish/Norwegian and Swedish/Finnish) by internal switch changes.

Associated Computer Industries, Inc., 17751 Sky Park East, Suite G, Irvine, CA 92714. (714) 557-0560.

CIRCLE 254 ON READER SERVICE CARD

Z8-BASED CRT

Micro Application Systems announces miniMas 2, the second member of its Z8-based CRT family designed for large volume applications.

Standard hardware features include: 12″ CRT, 7 x 9 dot matrix in a 9 x 13 field displaying all 128 ASCII codes, and 24 lines of 39 or 80 characters. Numeric pad, cursor and editing function keys, and reset key to terminate undesired action are also standard.

Standard software features include: page or scoll mode, transmit line or page unprotected only or all data with space suppression, new line mode, remote keyboard lock/unlock, erase from cursor to end of line or screen, and protected field mode in conjunction with any combination of attributes. List price is $888 with one page of memory and $959 with two pages of memory.

Micro Application Systems, Inc., 5575 North County Road 18, Minneapolis, MN 55442. (612) 559-0320.

BLACK AND WHITE MONITOR

Leedex Corporation has announced a 12″ black and white monitor, the Video 100-80.

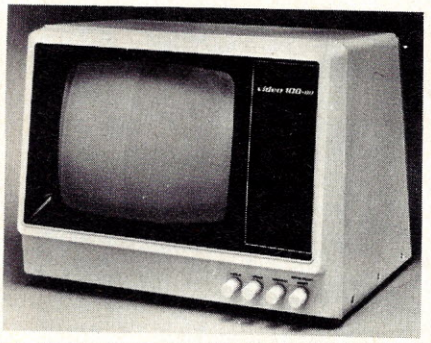
The removable face plate provides mounting space for a mini floppy disk, and there is space inside the cabinet for an 11″ x 14″ PC board for custom designed controller electronics.

The 90° deflection picture tube allows an 80-character by 24-line display, and the 12 MHz band width provides crisp, well-defined characters.

It features plug-in compatibility with Apple, Atari, Radio Shack, O.S.I., Microterm, and Exidy. $199.

Leedex Corporation, 2300 East Higgins Rd., Elk Grove Village, IL 60007. (312) 364-1180.

CIRCLE 255 ON READER SERVICE CARD



SMART CRT TERMINALS

TeleVideo, Inc. has introduced four smart, microprocessor-controlled CRT terminals, the 912B and 912C and the 920B and 920C.

Included as standard in all models are: upper and lower case, a printer/extension port, an imbedded numeric pad, remote computer control, selectable transmission rates from 75-9600 baud, and a host of editing and special functions. A serial RS-232C communications interface and 20 mA current loop are also standard features.

The terminals' non-glare, 12-inch diagonal CRT screens provide 12x10 dot matrix resolution and dual intensity for 1920 characters. A full 96-character ASCII set is displayed, in a 24-line by 80-characters/line format. Prices range from $875 to $1030.

TeleVideo, Inc., 3190 Coronado Dr., Santa Clara, CA 95051. (408) 246-5428.

CIRCLE 256 ON READER SERVICE CARD

CIRCLE 193 ON READER SERVICE CARD

CIRCLE 207 ON READER SERVICE CARD

Applications Software

RECREATIONAL, GAMES

Five Stones Software announces a **Gomoku** program for North Star Horizon DOS and CP/M based systems. The program, written by the current North American champion, requires a minimum of 32K bytes of RAM and is available on 5¼" diskette for $29.95. Five Stones Software, P.O. Box 1369, Station B, Ottawa, OT, Canada K1P 5R4.

CIRCLE 257 ON READER SERVICE CARD

Four-part music is available for the Sorcerer with a combination package which includes machine language software to generate four voice waveforms, a music editor and hardware which plugs into the parallel port via an RS-232 connector. $40. Howard Arrington, 9522 Linstock, Boise, ID 83704. (208) 377-1938.

CIRCLE 258 ON READER SERVICE CARD

Cyborg Wars for 16K TRS-80 Level II computers positions the players as rulers of a country inhabited by android subjects. $18. Strategem Cybernetics, 2 Washington Square Village, New York, NY 10012.

CIRCLE 259 ON READER SERVICE CARD

International Data Services announces two graphics programs for the TRS-80 Level II. **Microsketch III** is a "graphics drawing/automatic pattern drawing/graphic string creation/big print/automatic circle drawing program" which creates graphic screens which may be saved in memory, on tape, on disk or incorporated into other programs. $7.95. **Freakout** produces keyboard generated "farout" graphics and sound when the user presses the keys. $3.95. International Data Services, 340 West 55th St., New York, NY 10019. (212) 765-8610.

CIRCLE 260 ON READER SERVICE CARD

PERSONAL

Pro-Gress is a program which enables the user to do **multiple regression analysis** on Commodore's PET/CBM machines. It is written in Basic with special consideration given to running time. Cassette, $45; Diskette, $50. Cognitive Products, P.O. Box 2592, Chapel Hill, NC 27514.

CIRCLE 261 ON READER SERVICE CARD

Stock Tracker is a program which analyzes supply and demand factors on individual securities — stocks, options and commodities — and advises the user when to buy and sell. Disk Basic versions are available for the TRS-80 and Apple II or Apple II Plus and require 32K RAM. $150. H & H Trading Company, P.O. Box 23546, Pleasant Hill, CA 94523. (415) 937-1030.

CIRCLE 262 ON READER SERVICE CARD

Income Property Cashflow/ Leverage Analysis Program analyzes the effects of insurance, property taxes, utility expenses, interest payments, closing costs and debt service on the total amount of cash necessary for purchase of income property, as well as the total monthly payment. It also calculates the return on investment and the actual leverage achieved based on a user estimated annual appreciation rate. Cassette, $30; diskette, $35. Realty Software Company, 2045 Manhattan Ave., Hermosa Beach, CA 90254. (213) 372-9419.

CIRCLE 263 ON READER SERVICE CARD

Sat Trak International announces three programs that enable a TRS-80, Apple or Sorcerer user to find the geographical location of a satellite, locate it in space in relation to his location anywhere on earth and update its orbital parameters based on a visual or radio observation. Prices range from $20 to $65. Sat Trak International, c/o Computerland of Colorado Springs, 4543 Templeton Gap Rd., Colorado Springs, CO 80909.

CIRCLE 264 ON READER SERVICE CARD

WORD PROCESSING

A new version of **EasyWriter** enables the user to create, review, and revise documents on an 80-column upper and lower case Apple II video display. Two additional modules are available to complement the system: **EasyMailer** is a form letter module which automatically inserts information from a name and address file into an EasyWriter text file; **EasyMover** transmits text across common telephone lines to any other Apple computer. Information Unlimited Software, 793 Vincente St., Berkeley, CA 94707. (415) 525-4046.

CIRCLE 265 ON READER SERVICE CARD

WordMagic II is a word processor designed specifically for the TRS-80 Model II. Features include TRS file compatibility, full cursor control and edit capability, paging, printing and automatic page number insertion. $100. CalData Systems, P.O. Box 178446, San Diego, CA 92117.

CIRCLE 266 ON READER SERVICE CARD

Computer Bugs announces a **Text Editor** designed to allow the TRS-80 Model II to be used as a word processor. It requires a 64K system with one disk drive. $39.00. Computer Bugs, P.O. Box 789, Boynton Beach, FL 33435. (305) 737-4738.

CIRCLE 267 ON READER SERVICE CARD

Small Business Systems Group announces the Deluxe **Personal Finance Package** for use on 32K TRS-80 Level II computers with two disks. Among other things, the program will support up to 900 transactions per year in 33 different budget categories, maintain a checking account balance, estimate average monthly expenses and provide up to ten savings account summaries. Small Business Systems Group, Corner Main St. and Lowell Rd., Dunstable, MA 01827. (617) 649-9595.

CIRCLE 268 ON READER SERVICE CARD

Basic to Electric Pencil File Conversion for the TRS-80 Level II converts any Basic program or data file to an Electric Pencil file automatically. It will run under any version of TRSDOS or NEWDOS. $3.95. International Data Services, 340 West 55th St., New York, NY 10019. (215) 765-8610.

CIRCLE 269 ON READER SERVICE CARD

EDUCATIONAL

An educator in San Diego has developed **reading, language arts** and **math** programs for the TRS-80. The programs are designed for use by students in grades one to six. $9.50 and up. Educational Programs, Disney Electronics, 6153 Fairmount Ave., San Diego, CA 92120.

CIRCLE 270 ON READER SERVICE CARD

BUSINESS

An **Inventory Program** for 48K Apple II or Apple II Plus includes the following inventory categories: stock number, description, vendor ID, class, location, reorder point, reorder quantity, cost, selling price, number on order, order date and quantity on hand. All reports may be entered, changed, updated, deleted or viewed. The program is menu-driven and requires two disk drives. $140. Software Technology for Computers, P.O. Box 428, Belmont, MA 02178.

CIRCLE 271 ON READER SERVICE CARD

Systems Software

LANGUAGES

Microsoft announces TRSDOS-compatible versions of their **Cobol and Basic compilers** for the TRS-80 Model II. Both compilers provide complete facilities for commercial or in-house software development, including Microsoft's standard macro assembler and linking loader. Basic compiler, $395; Cobol-80 compiler, $750. Microsoft, 10800 NE Eighth, Suite 819, Bellevue, WA 98004. (206) 455-8080.

CIRCLE 272 ON READER SERVICE CARD

The **Nevada Cobol** compiler for CP/M based systems is designed specifically for small businesses using microprocessors. $99.95. Ellis Computing, 1480 17th Ave., San Francisco, CA 94122. (415) 664-1534.

CIRCLE 273 ON READER SERVICE CARD

A **multi-user Cobol,** designed to run on Chieftain small business systems, is available from Smoke Signal Broadcasting. Running under BOS (Business Operating System), it controls all aspects of program development, from initial input of source programs through compilation and testing to the operation of a complete business system. $1700. Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91361.

CIRCLE 274 ON READER SERVICE CARD

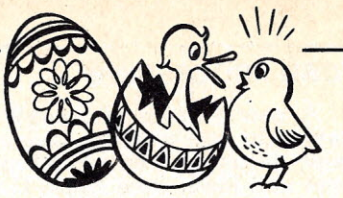
A Model I **TRS-80 Fortran** software package makes it possible for the experienced Fortran programmer to write, compile and execute Fortran programs. The package includes a Fortran user's manual, compiler, Fortran-80 and Link-80 reference manuals, Edit-80 user's manual, and a Fortran subroutine library. It requires a Level II TRS-80 with 16K RAM, expansion interface with 16K RAM, and at least one disk drive. $99.95. Available from participating Radio Shack Computer Centers, stores and dealers.

Symbolic/Structured Basic for 8-32K PET computers is a precompiler said to enhance the PET's basic monitor with the addition of extra control statements. S-Basic includes an editor, translator/precompiler and the S-Basic Loader. $35.95. Softside Software, 305 Riverside Dr., New York, NY 10025.

CIRCLE 275 ON READER SERVICE CARD

APL80, an adaptation of APL to the TRS-80, is now available. The 32K disk version includes four workspaces containing lessons on APL for the beginner and the book **APL: An Interactive Approach.** $49.95. A 16K Level II cassette version is available without the lessons or the book. $14.95. The Software Exchange, 6 South St., Box 68, Milford, NH 03055. (800) 258-1790.

CIRCLE 276 ON READER SERVICE CARD



DATA BASE SYSTEMS

Analysis Pad from the Bottom Shelf is a columnar calculator which enables the user to create a 30 x 40 matrix for data entry. The program, which allows the user to create column and row labels, requires 48K. $49.50. The Bottom Shelf, Inc., P.O. Box 49104, Atlanta, GA 30359. (404) 939-6031.

CIRCLE 277 ON READER SERVICE CARD

The **String/80 Bit** is a collection of string and file handling routines specifically designed to operate in the Z80/8080 CP/M environment. The relocatable routines, written in assembler language, utilize the Microsoft Fortran convention of register handling, and are available on 5 or 8-inch CP/M compatible soft sectored floppy disk. $95. Key Bits, Inc., P.O. Box 592293, Miami, FL 33159.

CIRCLE 278 ON READER SERVICE CARD

Micro Data Base Systems announces a **hierarchical (tree-structure) data base management system** for Z-80, 6502 and 8080 based micro-computers. Written in machine language, the system includes commands to add, delete, update, search and traverse the data base. Z-80 version, $250; 6502 and 8080 versions, $325. Micro Data Base Systems, Inc., P.O. Box 248, Lafayette, IN 47902. (317) 742-7388.

CIRCLE 279 ON READER SERVICE CARD

IDM-M2, an **interactive data manager** for the TRS-80 Model II, features data base initialization, data base manipulation, report writer and report generator. Written in Basic, it requires 64K of memory. $199. Micro Architect, 96 Dothan St., Arlington, MA 02174.

CIRCLE 280 ON READER SERVICE CARD

UTILITIES AND MISCELLANEOUS

Microproducts announces **Applebug**, a programming aid and software debugging tool that assists in developing, debugging and testing machine language code on the Apple II. It will also facilitate tracing the logic of existing machine language programs such as the monitor, DOS and Applesoft. $29.95 on diskette. Microproducts, 2107 Artesia Blvd. Redondo Beach, CA 90278. (213) 374-1673.

CIRCLE 281 ON READER SERVICE CARD

Apple Data-Graph is a hi-res data-graphing program which plots line graphs, dot graphs and scatter plots. Up to three 40-point curves may be plotted on the same co-ordinates with X and Y axes dimensioned. Curves may be saved to disk and recalled for later use. The program requires a 32K Apple with Applesoft ROM and one disk drive. $35. Connecticut Information Systems, Co., 218 Huntington Rd., Bridgeport, CT 06608. (203) 579-0472.

CIRCLE 282 ON READER SERVICE CARD

Line Printer, which requires a 32K TRS-80 with disk and Centronics printer, is designed to upgrade any Basic program that generates printed reports. It has the ability to set aside up to 16K of memory as buffer, enabling the computer to printout as a background task. $24.50. The Bottom Shelf, Inc., P.O. Box 49104, Atlanta, GA 30359. (404) 939-6031.

CIRCLE 283 ON READER SERVICE CARD

Microsoft Consumer Products announces **Editor/Assembler-Plus,** an editing, assembling and debugging package for the TRS-80. Major new Assembler features include the ability to assemble directly into memory, conditional assembly and macro facility. $29.95 on cassette. Microsoft Consumer Products, 10800 NE Eighth, Suite 819, Bellevue, WA 98004. (206) 454-1315.

CIRCLE 284 ON READER SERVICE CARD

AGENS, an **assembly generation system,** allows the user to assemble machine language programs for any of the popular 8 and 16-bit microcomputers. The system is available on 8-inch diskette for use on CP/M Z-80 computer systems. $170. RBB Software Products, P.O. Box 2111, Yorba Linda, CA 92686. (714) 637-5965.

Reviews

Stephen B. Gray

More Basic Computer Games, edited by David H. Ahl. Creative Computing Press, Morristown, NJ. 195 pages, paperback $7.50. 1979.

Fulfilling the promise made in the microcomputer edition of "Basic Computer Games," that a second volume was coming, this game book contains "84 Fabulous Games for Your Personal Computer," according to the cover, which adds, "All in Basic with program listing and sample run."

As the introduction puts it, there are games here that teach resource management (such as Camel), let your children perfect their matching and memory skills (Concentration), navigate in a three-dimensional universe (Maneuvers), start your whole life over again (Millionaire), or let your kids "argue with the computer — instead of you — if they want to stay out late on Saturday night" (Father).

If you read **Creative Computing** religiously, many of these games may look familiar, because 34 of them first appeared in the magazine. The 34 include Artillery 3, Bible Quiz, Blackbox, Bocce, Condot, Deepspace, Geowar, ICBM, Mastermind, Motorcycle Jump, Nomad, Roadrace, Rotate, Schmoo, Seawar, Twonky, UFO and Wumpus.

Even if you have all the back issues of **Creative**, the book still contains 51 programs you may not have seen before, including Baccarat, Big 6 (carnival betting wheel), Bombrun, Camel (hazardous trek across the desert), Chuck-A-Luck, Close Encounters (avoid the UFO or destroy it), Concentration, Convoy (naval war game), Corral (tame a wild horse), Eliza (the psychiatrist), Grand Prix, Joust (with a knight), Man-Eating Rabbit, Millionaire, Minotaur, Pinball, Shoot (last two survivors of total atomic war), Smash (one-lap jalopy race), Tennis and Warfish (submarine game).

Although nearly all the programs here are for interactive games, a few are not, such as Inkblot (randomly generated Rorschach designs), Lissajous, Pasart (patterns based on Pascal's triangle), Scales (generates 11 types of musical scales starting at a chosen note) and Ticker Tape.

The games are all in Microsoft Basic. Two pages on Basic are provided, along with details on how to convert the games to other Basics.

Some of the games in this second volume are available on tape cassette and floppy disk from **Creative**, either from your local computer store or directly from **Creative Computing.**

The many illustrations by George Beker, mostly of robots, are highly imaginative and fascinating in their own right.

The 84 games here will keep you busy and intrigued for many, many months, as well as develop your imagination, memory and reflexes.

What's missing from this volume is the "Contents by Game Category" that was in the first book, which listed the games under categories such as educational, matrix manipulation, logic, space, sports simulation, combat, etc. Regardless, this book is an absolute must for anybody who calls himself a computer gamesman. And at 9¢ a game, the price is right!

Z80 Assembly Language Programming, by Lance A. Leventhal. Osborne & Associates Inc., Berkeley, CA. 642 pages, paperback $9.50. 1979.

This is the fourth in Dr. Leventhal's series on microcomputer assembly languages, written in his usual detailed, expert style.

The book includes features such as over 80 programming examples, all problem solutions in source code and object code, comparisons of Z80 - 8080A/8085 instruction sets, full explanation of each Z80 instruction, how to program the Z80 interrupt system and Z80 input/output devices, and interfacing methods.

After a short introductory chapter, Leventhal jumps right into a chapter on assemblers that has a great deal of **what,** but very little **why** for the neophyte. A reader with experience in assemblers should have little or no trouble with this book, but a beginner will find it tough going unless he's quite bright, highly motivated and makes sure he understands every sentence before going on to the next.

Subsequent chapters are on the Z80 Assembly-Language Instruction Set, Simple Programs, Simple Program Loops, Character-Coded Data, Code Conversion, Arithmetic Problems, Tables and Lists, Subroutines, Input/Output, Interrupts, Problem Definition and Program Design, Debugging and Testing, Documentation and Redesign, and Sample Projects (digital stopwatch, digital thermometer).

There may never be a better book on the Z80 assembler than this one, but only a fantastically dedicated beginner, or a professional, will get beyond the middle of the third chapter. This book separates the men from the boys, the really serious programmers from the tinkerers.

A Beginner's Guide to Computers & Microprocessors — with projects, by Charles K. Adams. Tab books, Blue Ridge Summit, PA 17214. 303 pages, paperback $6.95. 1978.

Here's one more book explaining computers to beginners. One pleasant difference from many of the others is that Adams writes well, and makes many complex things quite understandable.

On the other hand, he doesn't write enough about many things. For example, a NAND gate is described in two short sentences, very clear but not enough to tell you what a NAND gate does. So the 1/3-page drawing, and the two sentences, like many others in this book, are wasted because they raise more questions than they answer.

Chapter 4, on Microprocessor Architecture, uses seven full pages on block diagrams of CPUs such as the 8080, 4040 and 8008, mainly filler material because these diagrams aren't discussed much in detail.

The book has two introductory chapters, four on hardware, two on software, one on systems and three on Building a Simple System. These last three comprise the "projects" in the book's title. Eighty pages are used to tell you how to build an 8080A-based system with 256 bytes of RAM, 512 of EPROM, a 16-button keyboard for data entry, a 10-button keyboard for program control, etc. Is anybody really interested in building such a system from a book? Especially one that has no photographs or diagrams showing you how to lay out the boards or the front panel, other than one drawing, of the "CPU parts layout."

The book does have some good portions, but is hampered by using only assembly language throughout (the words Basic and Fortran don't appear anywhere), being too skimpy in too many places, and spending 80 pages on a system that not one reader in a thousand will build.

Problems For Computer Solution: Student Edition, by Stephen J. Rogowski. Creative Computing Press, Box 789-M, Morristown, NJ 07960. 109 pages, paperback $4.95. 1979.

If this title is familiar to you, maybe that's because at least three books have been published using it, the best known being the one written by Gruenberger and Jaffray some years ago. Also, you may have seen the Rogowski book in its previous incarnation, published by Educomp Corp. in 1975. Educomp changed its name to Quodata, started marketing computer systems to municipal governments instead of to schools, and got out of publishing.

The book gives 90 problems for you to solve with a computer, divided into eleven categories: arithmetic, algebra, geometry, trig, number theory, probability, statistics, calculus, science, general and "unsolved."

Some of the problems are simple, such as figuring out the interest on the $24 the Indians are said to have sold Manhattan to the Dutch for. Or generating your own log tables. Some are not so easy, such as converting rational numbers to continued fractions, or finding self-generating integers. A couple have never been solved.

This is a fine book, with clear and concise writing, if you like the challenge of solving problems with computer programs. Even if some of the problems may not turn you on, the variety provided here should give you enough others to keep you busy for months, if not years. References are provided if you need to learn more about the problems.

A Teacher's Edition is also available, at $9.95, with problem solutions, a program that produces each solution, an analysis of each program and, occasionally, suggestions for further reading or research.

Best of Interface Age: Volume 1: Software in Basic, edited by Carl D. Warren. Dilithium Press, Portland, OR. 314 pages, paperback $12.95. 1979.

The title is misleading. Although this book is about four well-known Basic interpreters, they are all in assembly language. So this book is for hard-core assembler fans, or for anybody intending to really dig into what makes Basic tick, rather than for somebody looking for a collection of programs written in Basic.

The entire book is taken up with the four interpreters: Lawrence Livermore 8080 Basic; Li-Chen Wang's Palo Alto TINY Basic; National's TINY Basic-NIBL; and "The Great Experiment — Floppy ROM #1," Robert Uiterwyk's 6800 4K Basic.

The two appendices may well be unique in books on personal computing: the first is a "comprehensive index of general-purpose software printed in Interface Age since January 1977," and the second is a "list of all the back issues that are still available, and how to obtain them." Tch-tch.

The preface, by Carl Warren, who was editor-in-chief of Interface Age at the time of publication, and who, at this writing, is the West Coast editor for EDN magazine, notes that more volumes of the "Best of Interface Age" are forthcoming, one on general-purpose software, two for the "small businessman" (5'5" and under?), and one that "contains those articles for the futuristic thinker and gadgeteer."

The preface also says that the four reprinted articles in this book "provide the reader with some of the most useful software ever created." Useful now for study, and for that purpose highly welcome by the small fraternity of assemblerniks. But surely not intended for direct use on your computer or mine . . .

Introduction to T-BUG, by Don Inman and Kurt Inman. Dilithium Press, Portland, OR 97210. 125 pages, paperback $6.95. 1979.

The back cover says this is "the only book to describe in detail the machine-language monitor operations of the popular Radio Shack TRS-80 computer." It also says that "Kurt Inman is Don's 15-year-old son and an author in his own right."

As with every other publication involving machine-language monitors, this one doesn't say a word about why a TRS-80 owner should be interested in T-BUG. The authors apparently assume that if you buy the book, you're interested.

The book is based on seven "problems," meaning the authors tell you how, in detail, to perform seven specific tasks with T-BUG. These tasks are: display keyboard input, display data from memory, save and run programs on cassette, write a number-guessing game, create graphics with the 63 graphics characters, use graphics to enhance a computer game (Nim) and debug with T-BUG.

This is obviously only for the really serious programmer with an interest in learning more about T-BUG than available in the Radio Shack publications.

The major value of this book is that it shows, in great detail, how to do something, rather than just tell what T-BUG consists of and how to use it. If you go through this book conscientiously, using it with your TRS-80 rather than just reading it, you'll probably learn all you want to know about T-BUG.

Problems For Computer Solution, by Donald D. Spencer. Hayden Book Company, Inc., Rochelle Park, NJ. 122 pages, paperback $5.95. Second edition, 1979.

This is Hayden's edition of the same book originally published in 1977 by the author's own Camelot Publishing Company.

According to the back cover, this book is "intended for teachers and students who want more diverse problems than those offered in programming-language textbooks."

Just like the Rogowski book of the same title, also reviewed in this issue, Spencer's book presents problems in eleven categories: introductory problems (75 of them); algebra (127); geometry (104); trigonometry (34); probability and statistics (90); intermediate mathematics (118); number theory (86); science, chemistry and physics (38); business (64); fun and games with the computer (45); and "a smorgasbord of problems" (40).

That's a total of 821 problems, which works out to about seven-tenths of a penny per problem, compared with 5.5 cents a problem in Rogowski's book.

The big difference is that each problem is given a full page in the Rogowski book, whereas Spencer provides up to 10 or 12 problems per page. Most of Spencer's problems are quite short, such as "Find the greatest common factor of a given set of three numbers," or "Convert Roman numerals to Arabic" or "Write a program that generates random four-word sentences." Several are a third to half a page long, because they include details on such complex things as a "wheel of fortune" game, or the "sailors and coconuts" puzzle, or the drunk's random-walk problem. Within each chapter, the problems are said to be arranged in order of difficulty.

All in all, this is quite a bargain for the problem-hungry, with a large number of problems that should keep you in close contact with your computer for a very long time. Even if you work on only one out of every ten problems, you'll learn a great deal about computers and problem-solving if you can work them all out, or at least make a good try.

Introduction to Low-Resolution Graphics, by Nat Wadsworth. Scelbi Publications, 20 Hurlbut St., Elmwood, CT 06110. 80 pages, paperback $9.95. 1979.

Subtitled "How to draw lines, create shapes, animate figures, prepare charts for business or pleasure," this paperback combines some introductory material on graphics with advanced programs that are presented without derivation or much of an exploration.

The first 28 pages are good, with chapters on Getting Started (the display grid; turning points on with the Apple II, PET and TRS-80), Math (determining offsets in the three systems), Drawing Simple Shapes (triangles) and Drawing Lines (and circles).

Chapter 5, A Graphics Library, includes over seven pages of Apple II subroutines that draw pictures of playing cards, for a card game. This is too much for a beginner's book, which should be much simpler, unless the reader is content with simply using subroutines right out of the book.

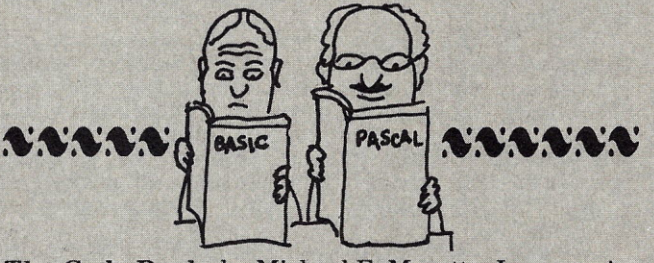
The same chapter presents a four-page Apple II program that draws a clown figure, with a mouth that opens and closes, an eye that winks, a hand that points right or left. Clever, but very little is given to help you understand how this program works. Also clever: how to add sound to the clown display.

The last 17 pages of the book are devoted to an animated game of football, with a listing for the Apple II (the author offers a coupon good for a free listing of the football game for the TRS-80 Level II or Commodore PET).

The programs for playing cards, clown and football are indeed interesting, but the book would be of much greater value if it stuck to the simpler side of graphics, and showed in detail, for instance, how to animate just one football player, instead of a whole team.

This is a book to buy once you've done some work in graphics, and are interested in advanced techniques. At this writing, this is only the second book available on personal computer graphics (see the review of Don Inman's "Introduction to TRS-80 Graphics" in the July 1979 **Creative**, p 159).

Several more books on graphics are on the way; let's hope they cover much more of the elements of graphics, instead of stopping at simple sinewaves, or getting too fast into advanced animation.



The Code Book, by Michael E. Marotta. Loompanics Unlimited, P.O. Box 264, Mason, MI 48854. 76 pages, paperback, $6.95. 1979.

This book is subtitled, "All About Unbreakable Codes and How to Use Them." It is described by the publisher as presenting "obscure secrets known only to international espionage agents and professional cryptographers — now revealed for you to use." Well, maybe.

The book is short (43 pages of text) and set in large type so it's the equivalent length of a long magazine article. Reading time is about a half hour. Appendix II includes 10 pages of random numbers, while Appendix I contains four short computer programs to add plaintext messages (A=1, B=2, etc.) to 5-digit random numbers. If you've read **The Ultra Secret** and any of Dover's cryptography books, you won't find anything new in this one. On the other hand, if you'd like a short summary of codes and cyphers with a dash of practical advice ("Remember that coding, program writing, verifying and obfuscating take up your own time") then you may find this book worthwhile. I didn't. —DHA

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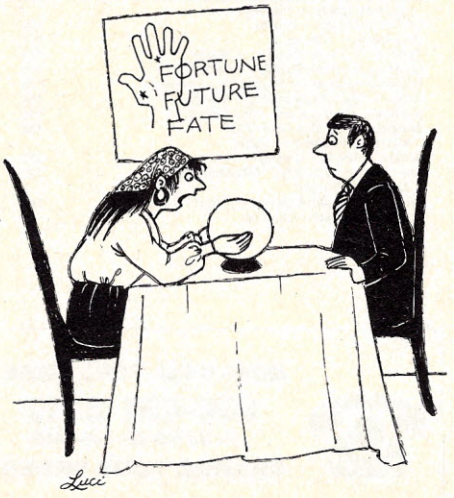

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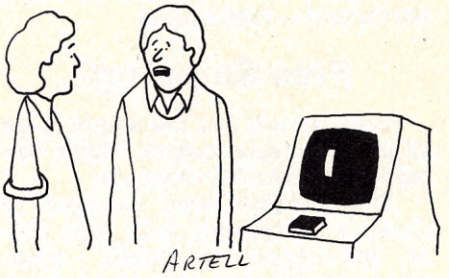

We may have taken this keyboard simplification thing one step too far.

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